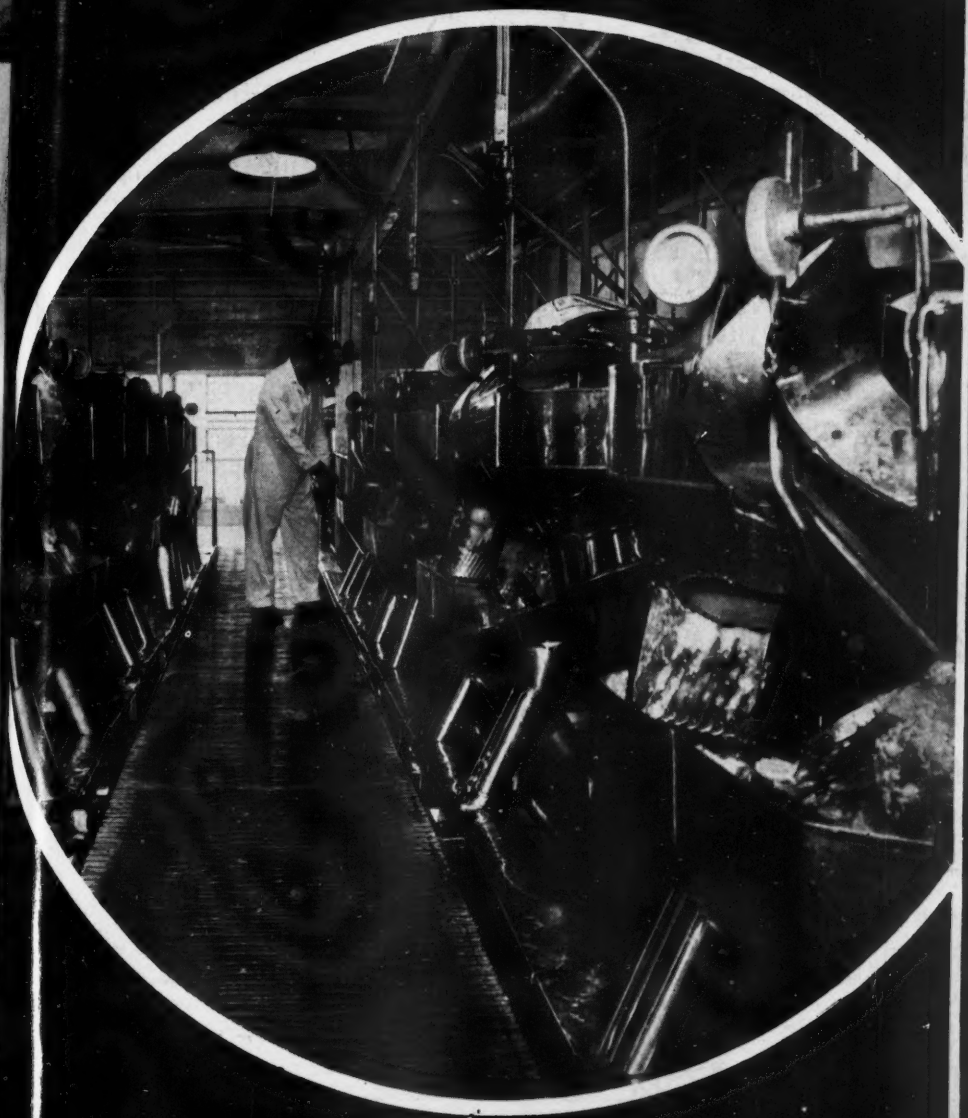
FOOD INDUSTRIES

● FOR THOSE WHO CONTROL QUALITY THROUGH MANAGEMENT AND PRODUCTION



SEPTEMBER 1943

Yield Tests Save Raw Materials

Converting Old Cans Into Crowns

Improvement Needed In Package Testing

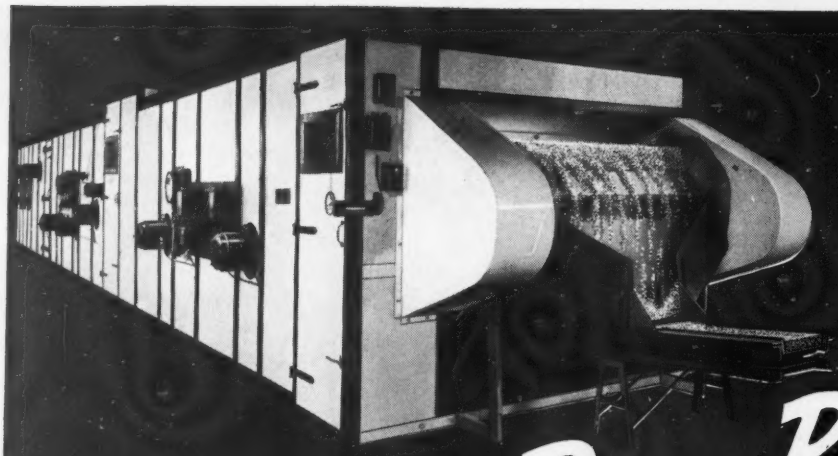
Machines Should Be Standardized

Small-Tube Heat Exchangers

Remote Factors Affect Policies

Debulking Dried Milk To Save Space

McGRAW-HILL PUBLICATION



Proven Performance...

H. C. BAXTER & BRO., Hartland, Maine Plant are dehydrating diced and julienne potatoes for the U. S. Army. The PROCTOR DEHYDRATOR replaced a competitive, manual loading type machine, and its merit has been so well proven, that Baxter are adding two additional units to further increase production.

TRUE FOODS DEHYDRATORS, Inc. PLANT, East Grand Forks, Minn. are dehydrating riced potatoes for Lend Lease at the rate of 125 tons (dry weight) per month. The second machine will step up their capacity to 250 tons (dry weight) per month.

Send for this new 20-page booklet "The PROCTOR Continuous Conveyor DEHYDRATOR" It tells in a series of pictures and captions, the complete story of continuous food dehydration as done using the PROCTOR DEHYDRATOR. This informative booklet is free to dehydrators and food processors interested in dehydration.

THESE TWO PROMINENT FOOD PROCESSORS HAVE FOUND THE PROCTOR *Continuous-Conveyor* DEHYDRATOR THE ANSWER TO PROFITABLE DEHYDRATION

With one season's service from their first Proctor Dehydrator, H. C. Baxter & Brother of Hartland, Maine, are adding two more units to their machine, to increase their capacity.

After having their first Proctor Continuous Conveyor Dehydrator in operation for one season, True Foods Dehydrators, Inc., East Grand Forks, Minn., have just contracted to install ANOTHER COMPLETE MACHINE!

Firms like True Foods and H. C. Baxter don't make major equipment investments of this size without justification. These firms are in business to turn out the best product they know how and at the lowest possible cost. Any equipment they buy is judged by the yardstick of proven performance. It must produce a uniformly good product... and it must operate economically. That's exactly what the PROCTOR Continuous Conveyor DEHYDRATOR does every day in every plant where one is in operation.

The PROCTOR Continuous Conveyor DEHYDRATOR operates automatically with a minimum of supervision, in a minimum of floor space. Its continuous operation and need for relatively little labor make this the ideal system where high production and low operating costs are prime requirements. Air-circulation up and down through the bed of vegetables on a traveling conveyor and accurate temperature control assure a uniform finished product. Full advantage is made of conveyor drying, so that in moving from one stage to another, the material is separated and rearranged to expose new surfaces for dehydration. The PROCTOR Continuous Conveyor DEHYDRATOR can be supplied in two- and three-stage units to suit individual production requirements.

PROCTOR DEHYDRATORS

Manufactured by

PROCTOR & SCHWARTZ · INC · PHILADELPHIA

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THE COVER

The juice is extracted from 300 oranges a minute by each of the automatic stainless steel machines on the production line shown on the cover. Fruit is carried to the machines on conveyor belts, is cut in half by stainless steel knives, and each half is gripped by a rubber cup and applied with controlled pressure to a revolving burr. This battery of extractors is in the plant of Mission Dry Corp., Los Angeles.

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★ ★ ★ CHANGE OF ADDRESS ★ ★ ★

McGRAW-HILL PUBLISHING COMPANY
330 West 42nd Street, New York, N. Y.
Director of Circulation:

Please change my address on "Food Industries"

From .....

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To .....

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Signed .....

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buell

DUST RECOVERY SYSTEMS

Recognized throughout industry for their outstanding qualities and performance

The high efficiency of Buell (van Tongeren) Powder Collectors, installed in conjunction with spray dryers in the dehydration of many food products, virtually eliminates powder losses in the exhaust.

Buell Powder Collectors specially designed for food processing, are made of special metals to meet all Pure Food requirements. Rounded corners prevent lodgment of material, and hinged construction facilitates take-down for easy cleaning. Buell Powder Collectors have no moving parts, require little or no attention, and will not clog.

WRITE FOR BULLETIN G-842

BUELL ENGINEERING COMPANY, Inc.

SUITE 5000, 8 CEDAR STREET, NEW YORK 5, N. Y.

BUY WAR BONDS AND MAKE THE AXIS BITE THE DUST

FOOD INDUSTRIES is published monthly. Price 35c per copy. Allow at least ten days for change of address. All communications about subscriptions should be addressed to the Director of Circulation, Food Industries, 330 West 42nd St., New York, N. Y. Subscription rates: United States and Possessions, Mexico, Central and South American countries, $3 a year, $4 for two years, $5 for three years. Canada, $3.50 a year; $5 for two years; $6 for three years (payable in Canadian or U. S. Funds). Great Britain and British possessions, 30 shillings for one year, 60 shillings for three years. All other countries, $5 a year, $8 for two years, $10 for three years. Entered as second-class matter, Aug. 17, 1936, at Post Office, Albany, N. Y., under act of March 3, 1879.

THEIR *Under-Sea Safety*

guarded by

GREER PRECISION ENGINEERING

Men with the daring and resource to choose to serve on subs deserve the best in safety devices. In the U. S. Navy, they get that. The rigid standards of Greer engineering now go into producing such vital equipment.

In designing and constructing confectionery and bakery machines, Greer has always been a forward thinker. Our engineering has been in many respects revolutionary. Today, in producing precision war equipment, Greer is experiencing the most exacting schooling in how dependable machinery must be built.

Though we are now in production for the Navy, we have by no means forgotten our many friends who are using Greer Confectionery and Bakery Machines. Your future achievements, as well as any present problems of maintenance, concern us keenly. If you are blueprinting your post-war production now, Greer engineers are equipped to give valuable help in many types of operation — particularly where cooling, drying, and conveying are required. Call upon us. — J. W. Greer Co., 119 Windsor St., Cambridge, Mass.

Reliability and operation simplicity of Greer Streamlined Coater safeguard quality and production of chocolate-coated products.

MAKERS OF FAMOUS GREER MULTI-TIER CONVEYORS

★ ★ HIGHWAY TRANSPORT . . . VITAL TO VICTORY AND THE AMERICAN WAY OF LIFE ★ ★

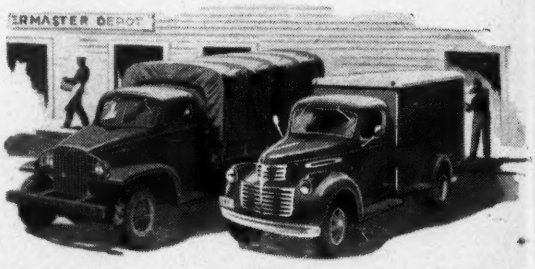
Huskier, Healthier, Happier

Today's American soldier is nearly an inch taller and ten pounds heavier than his older brother of World War I. He is the best fed, best clothed, best equipped fighting man on earth.

On the War Front, motor trucks are absolutely indispensable to an Army on the move . . . are the main means of transport for food, fuel and fighting equipment. On the Home Front, 40% of all our motor trucks are used to carry farm and food products . . . 69% of the war material shipped out of 741 plants surveyed was moved by truck.

America's millions of trucks . . . at home and in the Army . . . are giving all they've got to keep our soldiers Huskier, Healthier, Happier!

INVEST IN VICTORY . . . BUY WAR BONDS AND STAMPS



Joseph B. Eastman, director of the Office of Defense Transportation, recently stated: *"Automotive Transportation is absolutely essential to the winning of the War. Goods must reach their destinations and workers must get to their jobs . . . on time."* Join the U. S. Truck Conservation Corps and keep your trucks in best possible condition. Your GMC dealer is pledged to help you.

Pledged U.S. TRUCK CONSERVATION CORPS

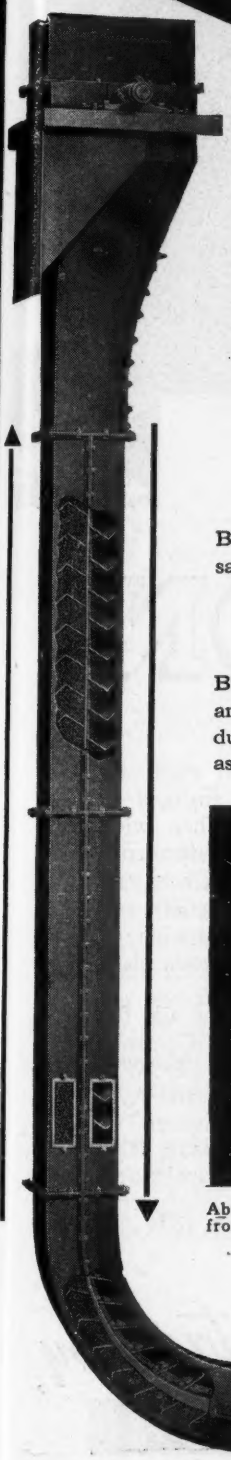
GENERAL MOTORS TRUCK & COACH

DIVISION OF YELLOW TRUCK & COACH MANUFACTURING COMPANY

Home of GMC Trucks and Yellow Coaches . . . Manufacturer of a Wide Variety of Military Vehicles for our Armed Forces

AN ELEVATOR, A CONVEYOR AND FEEDER IN A SINGLE UNIT

Bulk-Flo CONSERVES IN MANY WAYS



Bulk-Flo is outstanding in its ability to cut handling costs and to conserve critical materials and save space. It minimizes breakage and degradation, prevents leakage and reduces explosion and fire hazards. The necessity for multiple elevating and conveying units is eliminated, because the same unit conveys horizontally, vertically or on an incline.

Bulk-Flo is self-feeding, self-discharging and to a high degree self-cleaning. It handles flowable materials under all conditions of loading. It loads automatically—at one or at several points—without feeders. It automatically discharges at the head end of vertical runs or at one or more points on horizontal runs, or both as desired.

LINK-BELT COMPANY

Chicago 9 Philadelphia 40 Indianapolis 6 Atlanta Dallas 1 San Francisco 24 Toronto 8

Offices, warehouses and distributors in principal cities.

Saves Space

Bulk-Flo is unusually compact, effecting a considerable saving in space requirements and supporting structure.

More Flexible

Bulk-Flo can be laid out to carry vertically, horizontally, around corners, along curves and on slants of any degree. Loading and discharge points can be located to suit. Tandem units can also be used.

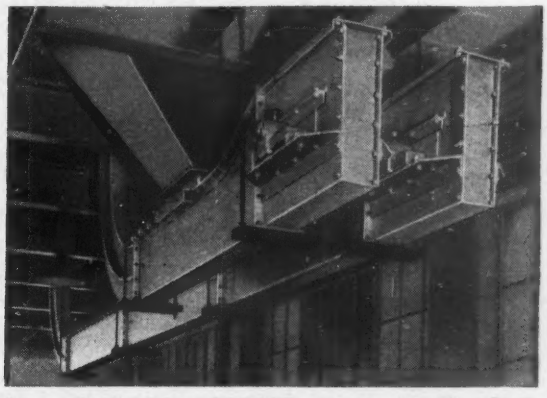
Self-Feeding, Enclosed

Bulk-Flo is self-feeding to capacity from bins, hoppers and chutes. It cannot flood. Material is moved in a dust-tight casing. It operates under partial loading with as high efficiency as when fully loaded.

Slow Speed; Large Capacity

Because the material in a Bulk-Flo moves en masse, the speed is slow; usually 30 to 60 ft. per minute. Large capacities are obtainable by large duct cross section, rather than by speed.

Above: A vertical run-around type Bulk-Flo handling chips from shaking screens to pulverizers, preparatory to packing.



Above: Loading runs of Bulk-Flo conveyors handling Spanish peanuts and almonds. Note compactness of installation; the Bulk-Flo units are suspended from the ceiling in this case, loading from storage located on the floor above.

9105

Insert shows two sides of fresh pork and their equivalent in cans of dehydrated meat plus lard in pound packages. The fresh sides are cut Wiltshire Style to show form in which pork went to England in World War I. Scientific processing and packaging saves space and conserves material in doing the same supply job today.

Brown Temperature Controllers

Temperature Controls for Meat

DEHYDRATION

FROM Swift & Company, Chicago, *dehydrated* pork is sent East and West, under Lend-Lease to our United Nations Allies.

At Swift & Company, dehydration of meat is a continuous process in which temperatures are held within defined limits so as to reduce the opportunity for bacterial development and at the same time, retain the maximum nutritional value of the product.

Temperature, the critical factor in the slow-drying process (dehydrating) is controlled by Brown Dual Air-Operated Thermometer Controllers (shown above at the right). These highly accurate instruments measure, record and control the various temperatures of the Rotary Dryers (Link-Belt Roto-Louvre). As the meat enters the dryers, it has approximately 50% moisture content at a temperature of approximately 155° F. Near the middle of the dryer, temperature of the meat is maintained at about 135° F. At the discharge end of the dryer, temperatures range from 145 to 155° F. and the moisture content averages 6 to 10% upon discharge from the dryer.

Brown and Minneapolis-Honeywell engineers are working closely with companies engaged in the dehydration of food products. Their wide experience in the application of temperature controls in the food industries qualifies them to recommend the correct instruments to safeguard and maintain uniform quality in the dehydration of foods. They will be glad to call at your plant without obligation.

In purchasing dehydration equipment ask for Brown and Minneapolis-Honeywell Controls. Catalogs sent on request. Write THE BROWN INSTRUMENT COMPANY, 4502 Wayne Avenue, Philadelphia, Pennsylvania, a division of Minneapolis-Honeywell Regulator Company, Minneapolis, Minnesota. Offices in all principal cities. 119 Peter Street, Toronto, Canada—Wadsworth Road, Perivale, Middlesex, England—Nybrokajen 7, Stockholm, Sweden.

Instruments by **BROWN** *and Controls by*

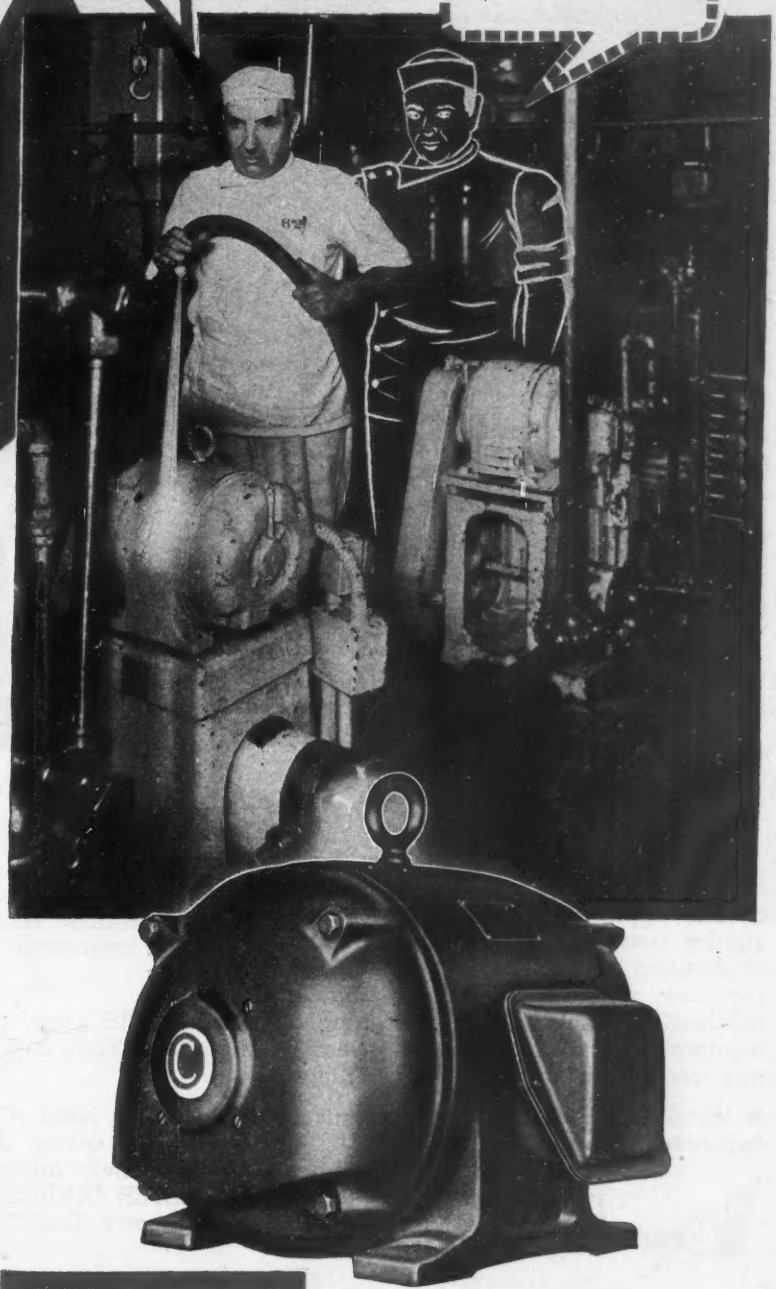
MINNEAPOLIS-HONEYWELL

Take a Look at TOMORROW—*Today!*

Get the *PROTECTION* of CENTURY SPLASHPROOF MOTORS

Mr. Now: We wash down the plant every day but these Century Splashproof Motors keep a-runnin'.

Mr. Postwar: I'm gonna remember Century for *all* my tough jobs.



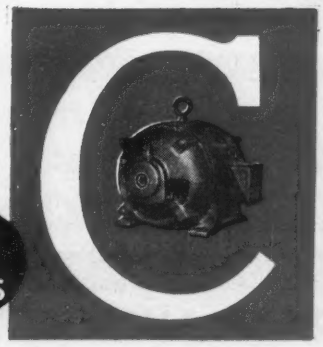
Engineered to provide full protection for indoor or outdoor installations against the effects of splashing liquids, water from plant washdowns, and falling solids, Century Splashproof Motors are also available with special insulations for use in atmospheres charged with abnormal concentrations of acids or alkalies.

Splashproof is only one example of the many Century Motor types, from fractional to 600 horsepower. And today, under the demands of War, finer Century Motors are being produced than ever before. Now—and after Victory—look to Century for *all* your electric motor requirements.

CENTURY ELECTRIC CO.
1806 Pine Street St. Louis 3, Missouri

Offices and Stock Points in Principal Cities

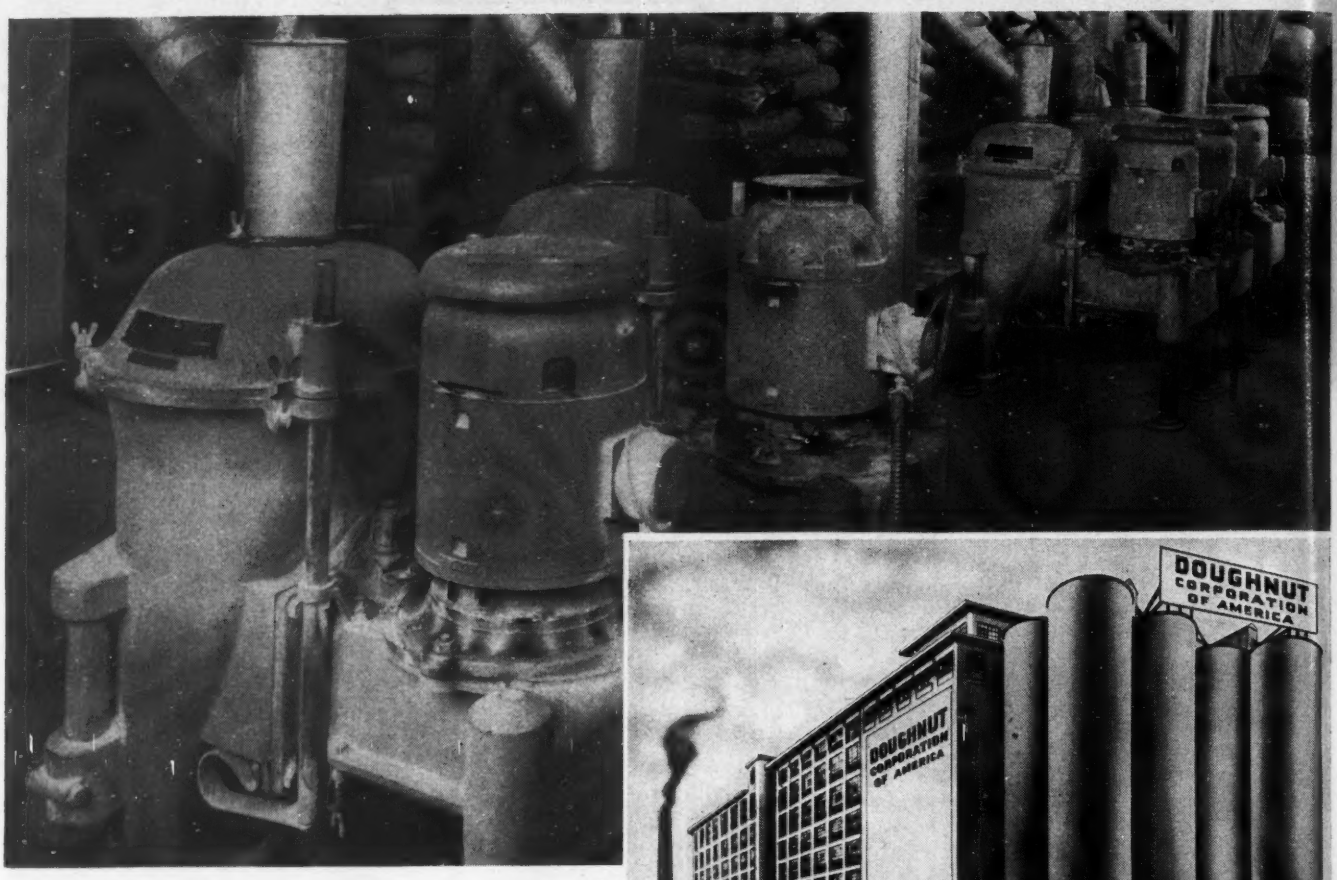
Century MOTORS



335

If you have not received our new bulletin on polyphase motors, write for it at once.

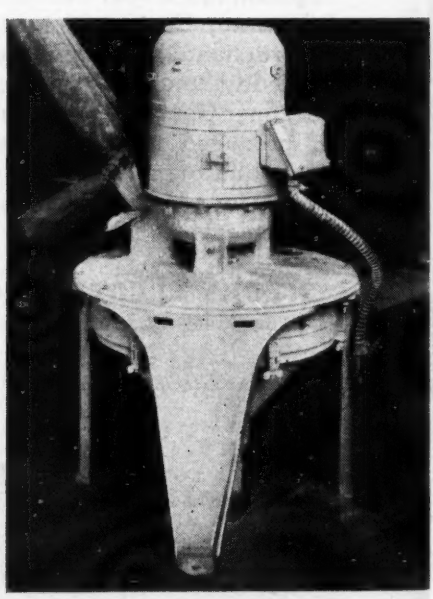
ENTOLETER PROTECTS THE QUALITY OF FOOD PRODUCTS . . . STOPS WASTE OF VITAL FOOD MATERIALS . . .



INTERESTED in safeguarding the high quality of its food products, the Doughnut Corporation of America was first to use the new "ENTOLETER". Experience with this improved method of insect infestation control has led the company to extend "ENTOLETER" applications in its modern plant at Ellicott City, Maryland. Top view: Some of the first "ENTOLETERS" purchased by the Doughnut Corporation. Lower view: Recent "ENTOLETER" installation in the same plant.

POSITIVE CONTROL OF INFESTATION . . . . .

The "ENTOLETER" positively destroys all insect eggs, larvae, pupae and adults in flour, cereals, spices, granulated, powdered and similar free-flowing dry materials. Protection is obtained by "ENTOLETING" both the incoming raw stock before processing, and the finished product before packaging. "ENTOLETERS" are entirely mechanical in their action. No heat is employed. They are simple and inexpensive to install and maintain.



● Write to us for free copy of article from a recent issue of *"Food Industries"*, describing "ENTOLETER" operation and giving detailed results of independent tests. It has timely interest and value for food processors. ENTOLETER DIVISION, The Safety Car Heating & Lighting Company, Inc., 230 Park Avenue, New York, N. Y.

ARMY E NAVY

. . . Awarded to The Safety Car Heating & Lighting Company, Inc., for outstanding war production.

ENTOLETER
INFESTATION DESTROYER

REG. U. S. PAT. OFF.

CONTINUOUS DESTRUCTION OF ALL INSECT LIFE

NEPTUNE, Inc.— Package Testers

(*A Report from Auckland, N. Z.*)

How it began we'll never know. Was the package dropped by a soldier leaping from a sinking transport? . . . or did someone lose a case of rations overboard? . . . was there an explosion of a shell or bomb? Was it stark tragedy or only that some soldier didn't like coffee?

Anyway, the little package of soluble coffee washed ashore near Auckland, New Zealand, more than two thousand miles south of the nearest fighting, to be picked up by a beach-strolling couple. They took it home to find the contents

> ★ *in perfect condition . . . although it must have been in the water for a considerable time*

They used the contents as directed on the wrapper and pronounced the result

> ★ *delicious and something entirely new to us*

That package, designed and made by Dobeckmun, had survived the hazards of storage, handling, shipping, and finally a terrific sea-going test—to deliver its delicate cargo "in perfect condition".

Dobeckmun ENGINEERED PACKAGING is serving in the war in many different ways, from rations to gas masks—from powdered soup to nuts for mobile equipment.

IT'S TIME TO PLAN

After Victory there will be new and old products seeking new and old markets. They will need new and better *protective and attractive* packages, wrappings and dressings. They can be made ready for postwar competition by starting their ENGINEERED PACKAGING plans now.

Subject only to Uncle Sam's requirements, Dobeckmun engineers can begin work on your packaging problems at once and it's not too soon to discuss them.

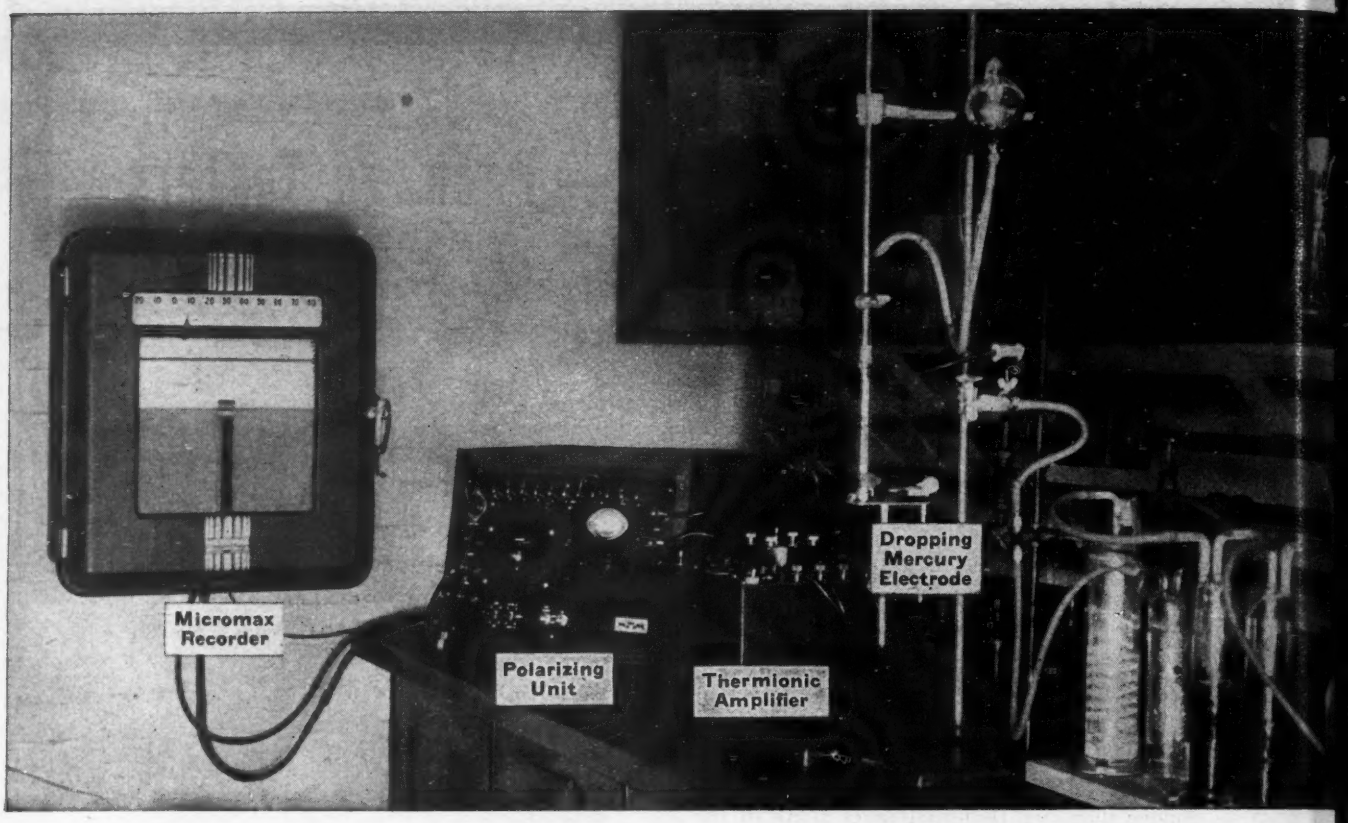
We'll be glad to hear from you.

★ Excerpts from voluntary letter reporting this incident. Photostatic copy on request.

THE WINNER! Standard for Emergency Rations—aluminum foil (.001 inch) coated one side with thermal plastic for hermetically heat-sealing all edges; the other side laminated with printed cellulose acetate. It is impervious to light and moisture.

THE DOBECKMUN COMPANY

CLEVELAND, OHIO · OAKLAND, CAL



Electro-Chemograph in the graduate laboratory of a University

Maybe *Electro-Chemograms* Can Help You Analyze Faster

An electro-chemogram is the record of a dropping-mercury-electrode's current and potential, as supplied by an L&N Electro-Chemograph. It makes the speed and sensitivity of the Heyrovsky-based methods more fully useful, because the record is an inked graph, rather than a photographic one. It thus shows the progress of an analysis while the analysis is still proceeding. This has two obvious advantages:

1. In process control, the time saved in analysis is passed on directly to the process, thus shortening the lag between time of sampling and time of any corrective control action.

2. In experimental analysis, the electro-chemogram helps the chemist to see and correct many faults in technique, while the analysis proceeds. Since the chemist must, at present, nearly always determine his own calibration of any dropping-mercury electrode graphs, he finds this feature particularly valuable.

A complete Electro-Chemograph equipment is shown above. The Polarizing Cell and Electrodes are simple, sturdy and adapted to a wide range of analyses. The Polarizing Unit makes available four "programs" of applied potential: For cathodic polarization, 0 to -3 v or $+1$ to -2 v; for anodic polarization, 0 to $+3$ v or -1 to $+2$ v. The complete range of 3 volts is covered in approximately 25 minutes, but an analysis may be started or ended at any desired potential within the range.

The time constant of the current-measuring system is equivalent to that of a galvanometer having a period of approximately 8 seconds. The full-scale current range of the equipment can be varied by the user in 8 steps from 2×10^{-6} amp to 100×10^{-6} amp; at the lowest value the approximate total concentration of the substance to be determined is 0.0005 gram equivalents per liter, and at the highest current this value is 0.025.

The amplifier is fully shielded and well insulated. The Micromax Recorder is, in general, our standard design, widely used for electrical measurement.

For further particulars of the Electro-Chemograph, see Bulletin E-94(1), which will be send on request.

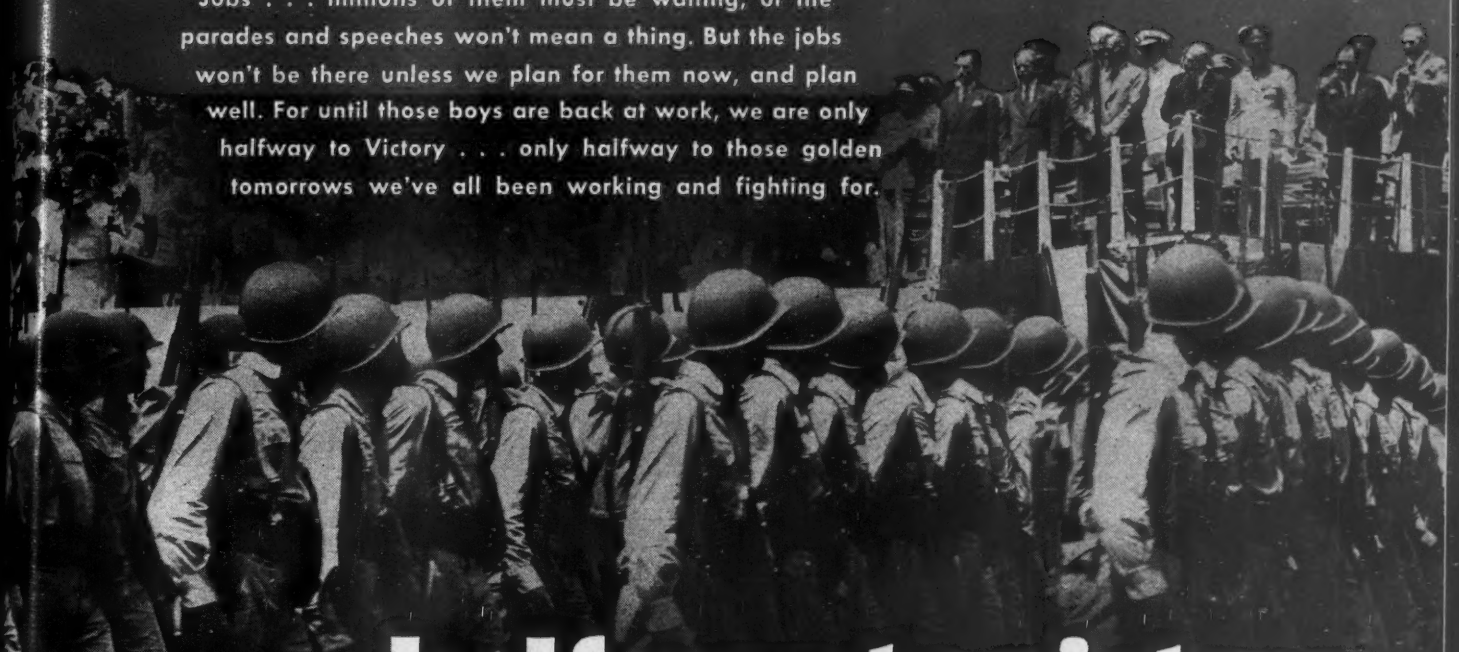
ARMY E NAVY
depends on me!
A Slogan for All Americans
Jrl Ad E-94(7a)

LEEDS & NORTHRUP COMPANY, 4912 STENTON AVE., PHILA., PA.
LEEDS & NORTHRUP
MEASURING INSTRUMENTS • TELEMETERS • AUTOMATIC CONTROLS • HEAT-TREATING FURNACES

Someday there will be Victory parades . . . lots of confetti and flowery speeches, but right around the corner from the speaker's platform there must be plenty of HELP WANTED signs.

Jobs . . . millions of them must be waiting, or the parades and speeches won't mean a thing. But the jobs won't be there unless we plan for them now, and plan well. For until those boys are back at work, we are only halfway to Victory . . . only halfway to those golden tomorrows we've all been working and fighting for.

buy more war bonds



halfway to victory

Sure you're busy with a war that's a whole of a long way from being won, but somehow you'll have to squeeze in a few minutes every day for some good, hard, down to earth planning. Plans for new products, improved products, and improvements for your plant.

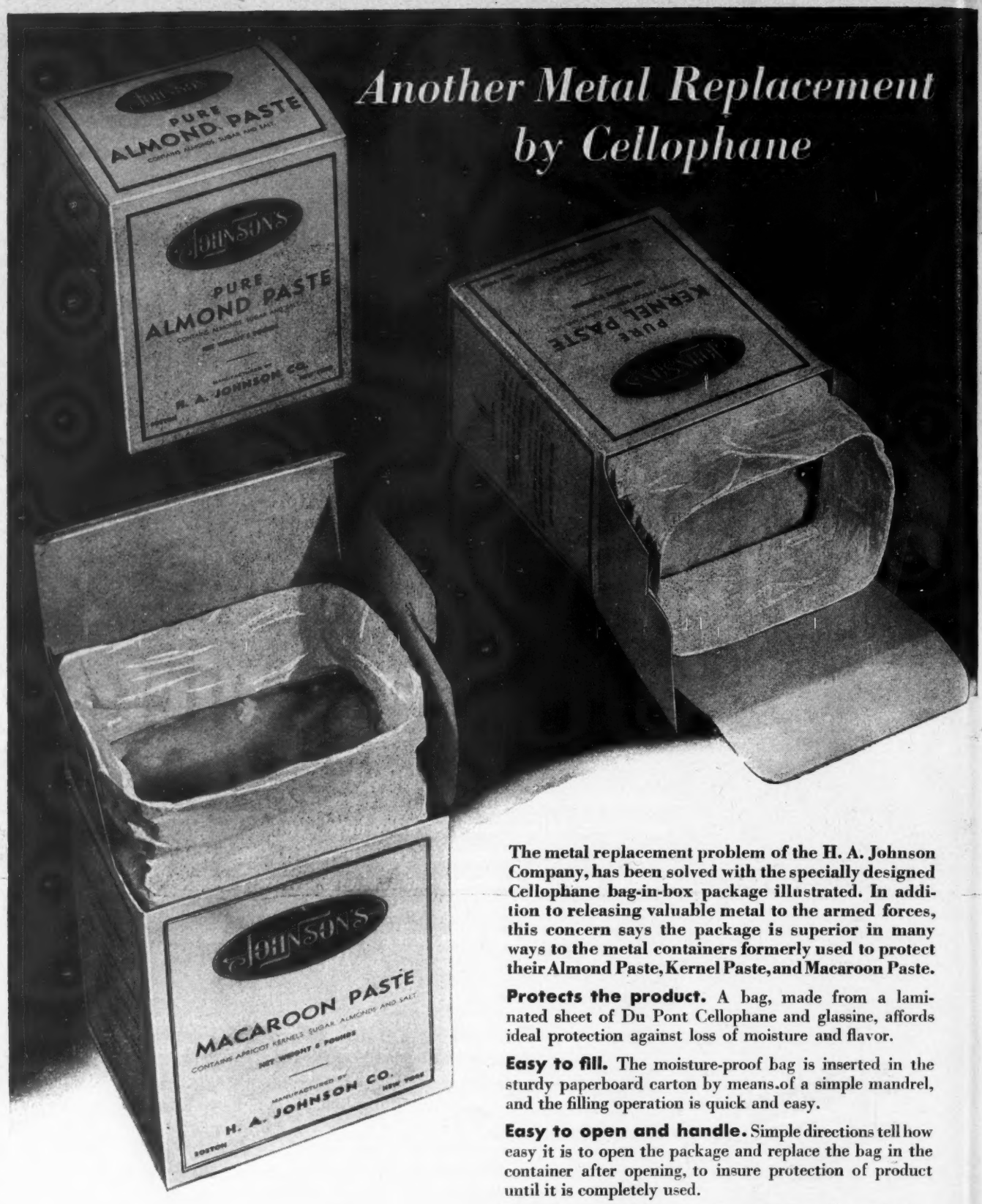
And when you plan your motor drives, we would like to sit in with you, because we can really help.

Take this machine on the left for instance. It's powered by a Master unit, which is an integrally built motor, a mechanical variable speed drive, a gear reduction unit, and is supplied with a flange mounting so the whole unit fits neatly into the machine.

It can be supplied for single phase, polyphase, or direct current operation . . . in open, fan cooled, or explosion proof construction, with or without the gear unit, with or without the variable speed drive . . . with an integrally mounted electric brake, if required . . . and its construction can be modified mechanically so that its method of mounting is practically unlimited.

Such wide flexibility can aid you materially in adding to the economy, safety, compactness and appearance of your motor driven products or plant equipment.

THE MASTER ELECTRIC COMPANY
DAYTON, OHIO



Another Metal Replacement by Cellophane

The metal replacement problem of the H. A. Johnson Company, has been solved with the specially designed Cellophane bag-in-box package illustrated. In addition to releasing valuable metal to the armed forces, this concern says the package is superior in many ways to the metal containers formerly used to protect their Almond Paste, Kernel Paste, and Macaroon Paste.

Protects the product. A bag, made from a laminated sheet of Du Pont Cellophane and glassine, affords ideal protection against loss of moisture and flavor.

Easy to fill. The moisture-proof bag is inserted in the sturdy paperboard carton by means of a simple mandrel, and the filling operation is quick and easy.

Easy to open and handle. Simple directions tell how easy it is to open the package and replace the bag in the container after opening, to insure protection of product until it is completely used.

If you have a metal replacement problem, let us work with you. E. I. du Pont de Nemours & Co. (Inc.), Cellophane Division, Wilmington, Delaware.

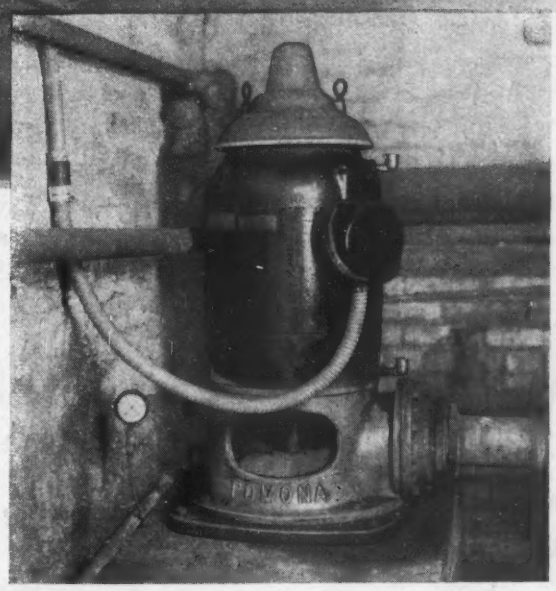
DU PONT
REG. U. S. PAT. OFF.

Cellophane *FOR VICTORY PACKAGES*

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

In industry after industry

Pomona Pumps are setting new performance standards!



Take this CANNING PLANT for example

Several years ago this Wisconsin canning company was faced with a critical emergency. In the middle of its peak canning season the main water supply pump broke down and a new pump had to be installed immediately to save the crop. The company turned to Pomona for help and the Pomona distributor met the emergency by expressing and installing within a few hours the Pomona Pump shown at right.

This was the canning company's first Pomona installation. But so satisfactory was its performance that two more Pomona Pumps were ordered to meet expanding needs for the next year. Close check was kept on the efficient performance, dependability and low operating costs of these pumps, and again Pomonas proved so outstanding that *three more* were ordered to replace other pumps in the company's operations.

Today these six Pomona Pumps are moving *more* water at *lower* cost with less maintenance than *any* pumps the company has ever used. A recent check shows that although production has been doubled, total water costs for the *doubled* production are now only 71% of former costs.

That means, on an equivalent production basis, Pomonas are actually costing only ⅓ as much to operate as former equipment . . . *an important saving in ANY plant!*

POMONA Vertical Turbine Pumps embody so *many* advanced features — features that save power, minimize maintenance, conserve space, and increase overall operating efficiencies — that they are literally revelutionizing pump performance standards in industry after industry. They are staying on the job *longer* with less upkeep. They are delivering *more* water against *higher* heads at greatly reduced power costs. They are cutting floor space requirements as much as 60% over that required for other-type pumps. *And they are making many other vital savings!*

These are *facts* backed by user-reports from thousands of Pomona installations in widely-varying industries . . . facts you should investigate before *your* next pump purchase. Pomona engineers will gladly supply complete details on the savings you can expect from a Pomona installation on *your particular* pumping job!

JOSHUA HENDY IRON WORKS

POMONA PUMP CO. DIVISION ● 50 CHURCH ST., NEW YORK 7, N. Y.

Plants:

4301 S. Spring Ave., St. Louis 16, Mo.; 206 Commercial St., Pomona, Calif.

CUT POWER COSTS

Pomona's semi-open impellers, easily adjustable at motor, vary the capacity of the pump according to requirement . . . and with proportionate savings in power. Eliminates wasteful throttling!

SAVE SPACE

Pomona's modern vertical design puts the pump at fluid level where it needs no priming . . . the motor at floor level where it occupies minimum space. Eliminates complicated priming equipment!

DELIVER MORE FLUID

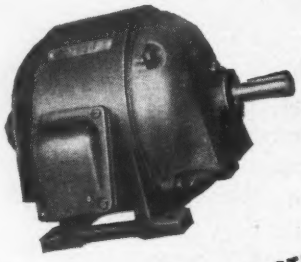
90%—*and higher*—pump efficiencies are not uncommon due to Pomona's Bulbous Vane End shape which smooths fluid flow—minimizes friction—increases efficiency!

TROUBLE-FREE OPERATION

Because all bearings below the motor head are fully lubricated by the fluid being pumped there is no risk of contaminating product or equipment with oil film. No oil or grease tubes to maintain.

POMONA
Water-Lubricated
PUMPS

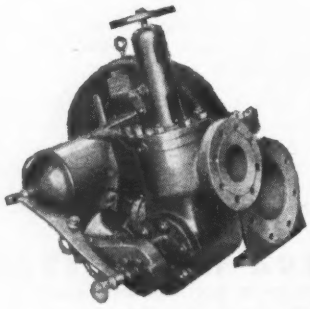
TO KEEP MULTI-STAGE



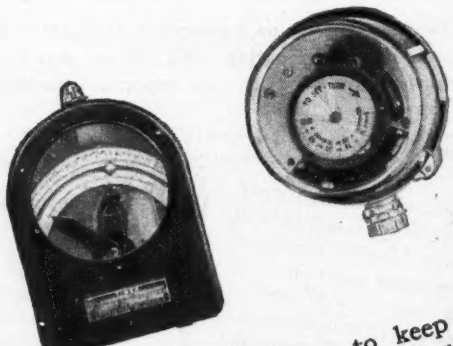
1 G-E "TRI-CLAD" INDUCTION MOTORS—for machine drives of every kind. Available in open and SPLASH-PROOF (shown) construction. Also totally enclosed. For low-speed drives, G-E gear-motors are available—motor and speed-reducer in a single unit.

2 G-E MOTOR CONTROL—A popular choice in food plants is the CR7008 *combination* starter, containing magnetic switch, circuit switch, and fuses. Standard motor controls can also be obtained in dust-tight (shown) or water-tight enclosures.

WASHING 1 2 → PEELING CUTTING 1 2 → INSPECTION 1 2 3 → BLANCHING 1 2 4 → TRAYING 1 2 5



3 G-E MECHANICAL-DRIVE TURBINES—supply low-cost drive for blowers, etc., while acting as a reducing valve to furnish low-pressure steam for dryer coils. Built in ratings from 5 hp up.



4 G-E TIME SWITCHES—to keep tabs on operating cycles, opening and closing circuits at predetermined intervals. A handy G-E chart (GES-2608) shows type best fitted for your time-control problem.

DEHYDRATION CONTINUOUS

PLAN AN ELECTRICAL SYSTEM THAT WON'T LET YOU DOWN!

IN modern two-stage or three-stage dehydration, continuous product-flow is more essential than ever. And it's not just a drying problem—but one of steady, uninterrupted materials handling, with the *drive* and the *control* for each operation closely "tied-in" together.

That's why new plants are now following the practice of other continuous-process industries in making sure of a *unified electrical system,* worked out from start to finish with the help of G-E application engineers.

With such a system, completely G-E equipped, there are no electrical misfits that may shut down the entire line. Operating controls are uniform; maintenance is easier. Responsibility for electric equipment is centralized, and G.E.'s strong local-office setup is quickly available for service.

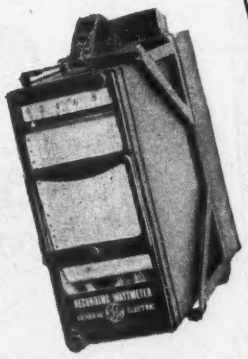
On any food-plant job essential to the war, a call to your G-E office will get prompt action!

General Electric Company, Schenectady, N. Y.

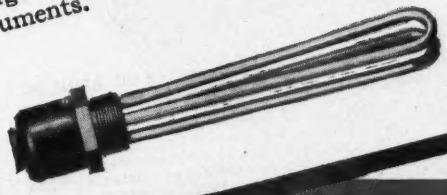
GENERAL ELECTRIC

658-4-110

BUY WAR BONDS



5 G-E AIDS FOR LABORATORIES AND PILOT PLANTS—Calrod heating units for ovens, hot plates, heaters, wherever flexible closely controlled heat is essential: Also electric indicating and recording instruments.



6 AIR-CONDITIONING SYSTEMS—including air washing, cooling, heating, humidification, etc. to produce a "quality-controlled" atmosphere in production areas.

7 LIGHTING FOR INSPECTION—using G-E MAZDA incandescent or fluorescent lamps, "tailored" to the needs of the job.

8 ELECTRONICS—Photoelectric relays and related devices for weighing, packaging, counting, or control.

9 POWER DISTRIBUTION—from substation to the point of use, including cable, unit substation, switchgear, circuit breakers, meters, instruments.

IT PAYS TO TALK TO THE

Bemis Multiwall Paper Bag Expert

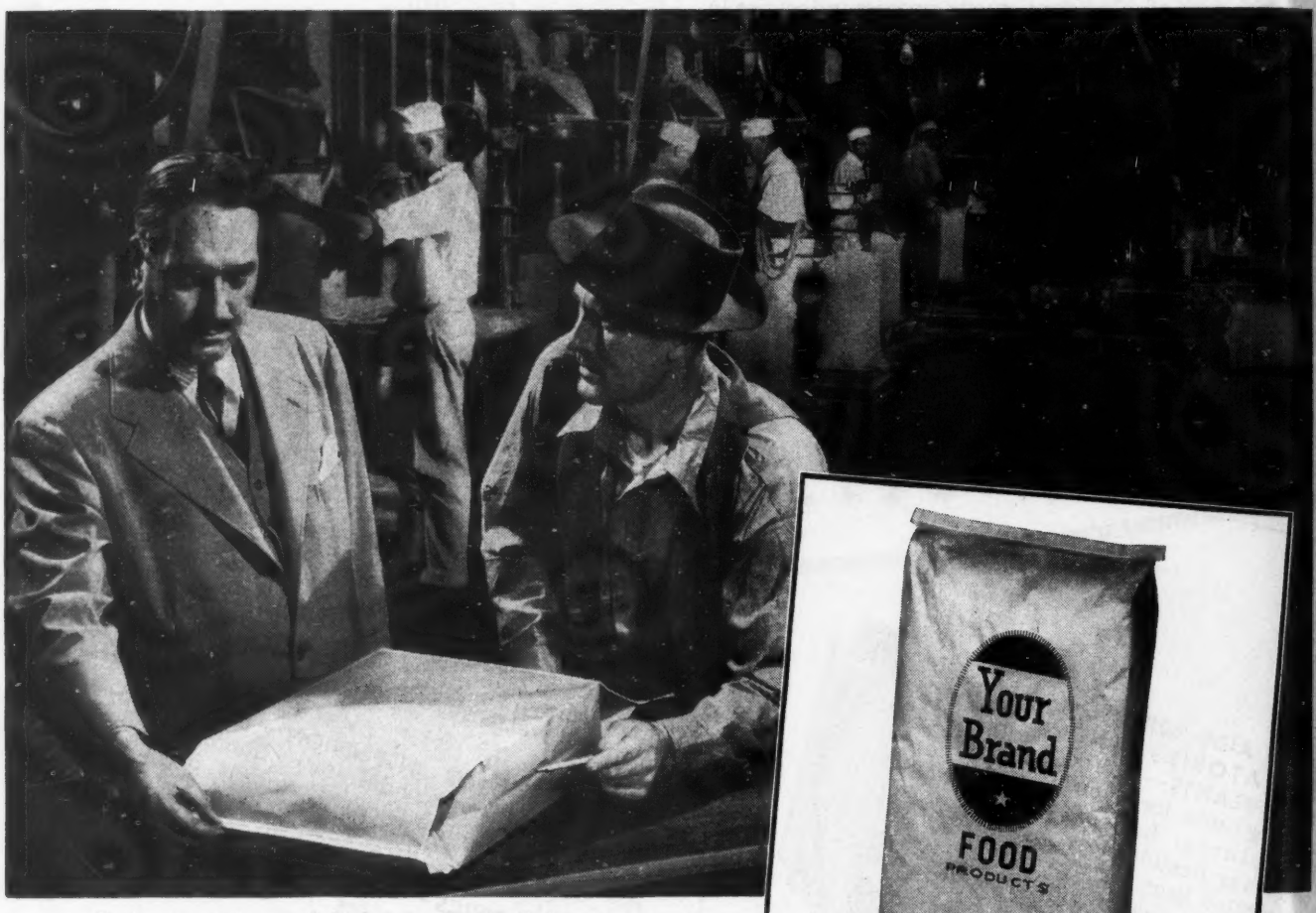
"You're more than just a bag expert. You're a detective!"

That's what a bag user said after one of our Multiwall Paper Bag experts visited his plant and solved a troublesome packaging problem which had been stealing his profits.

The counsel of our staff covers every phase of packaging by the bag . . . the bags themselves, filling and closing, shipping and storage. Our experts can give competent advice on these subjects because they *know* every angle of packing and shipping. Often they show manufacturers how to increase production and cut costs in the packing room.

Services of our experts are available to you without cost or obligation . . . whether you're a Bemis customer or not.

Next time you have a packaging problem, write or wire our nearest office. We'll have an expert on the job promptly . . . and it won't cost you a penny!



Bemis representatives are the kind of men who take off their coats and tackle a problem from a practical, experienced point of view.

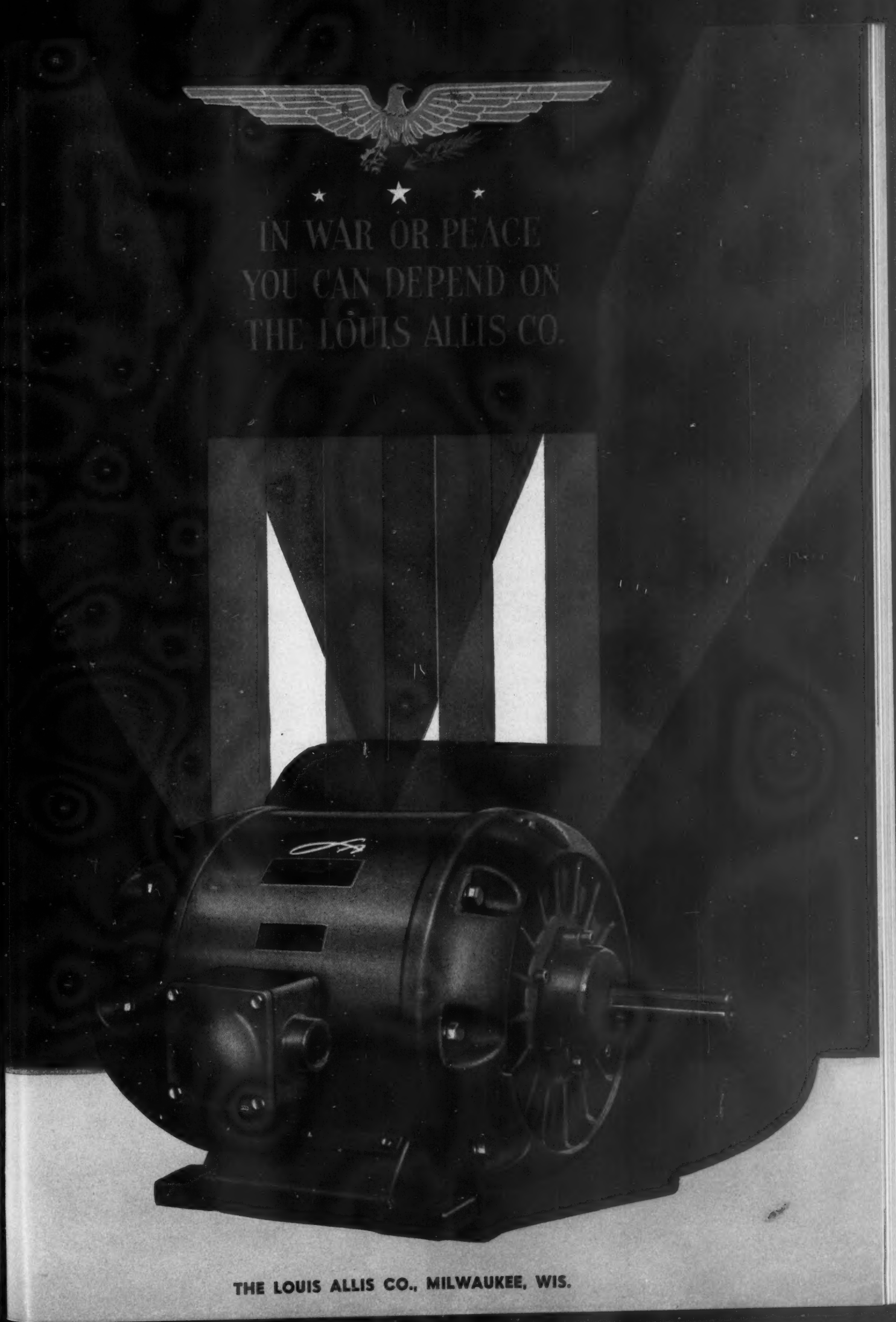
FOOD INDUSTRY CUTS COSTS AND REDUCES LOSSES WITH BEMIS MULTIWALL PAPER BAGS

Bemis Multiwall Paper Bags for powdered or granular products are economical, one-trip containers that insulate against moisture and thus reduce caking and loss of quality. Their extra strength maintains output by minimizing breakage on production lines. Bemis self-forming gussets speed filling and closing. Brilliant Bemis printing makes brands stand out.

BEMIS BRO. BAG CO.

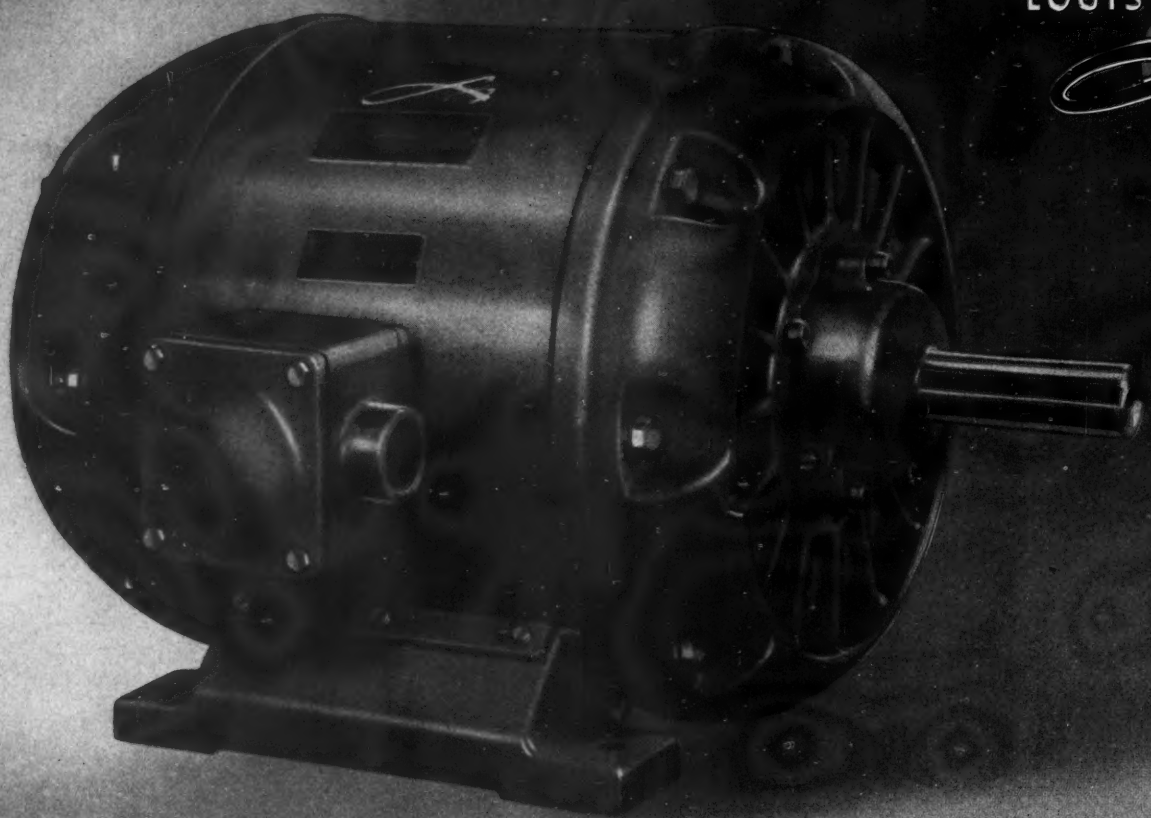
East Pepperell, Mass. • Peoria, Ill. • San Francisco, Calif.
Wilmington, Calif. • St. Helens, Oregon

Baltimore • Boston • Brooklyn
Buffalo • Charlotte • Chicago
Denver • Detroit • Houston
Indianapolis • Kansas City
Los Angeles • Louisville • Memphis • Minneapolis • New Orleans • New York City • Norfolk • Oklahoma City • Omaha • St. Louis
Salina • Salt Lake City • Seattle • Wichita



THE LOUIS ALLIS CO., MILWAUKEE, WIS.

LOUIS A



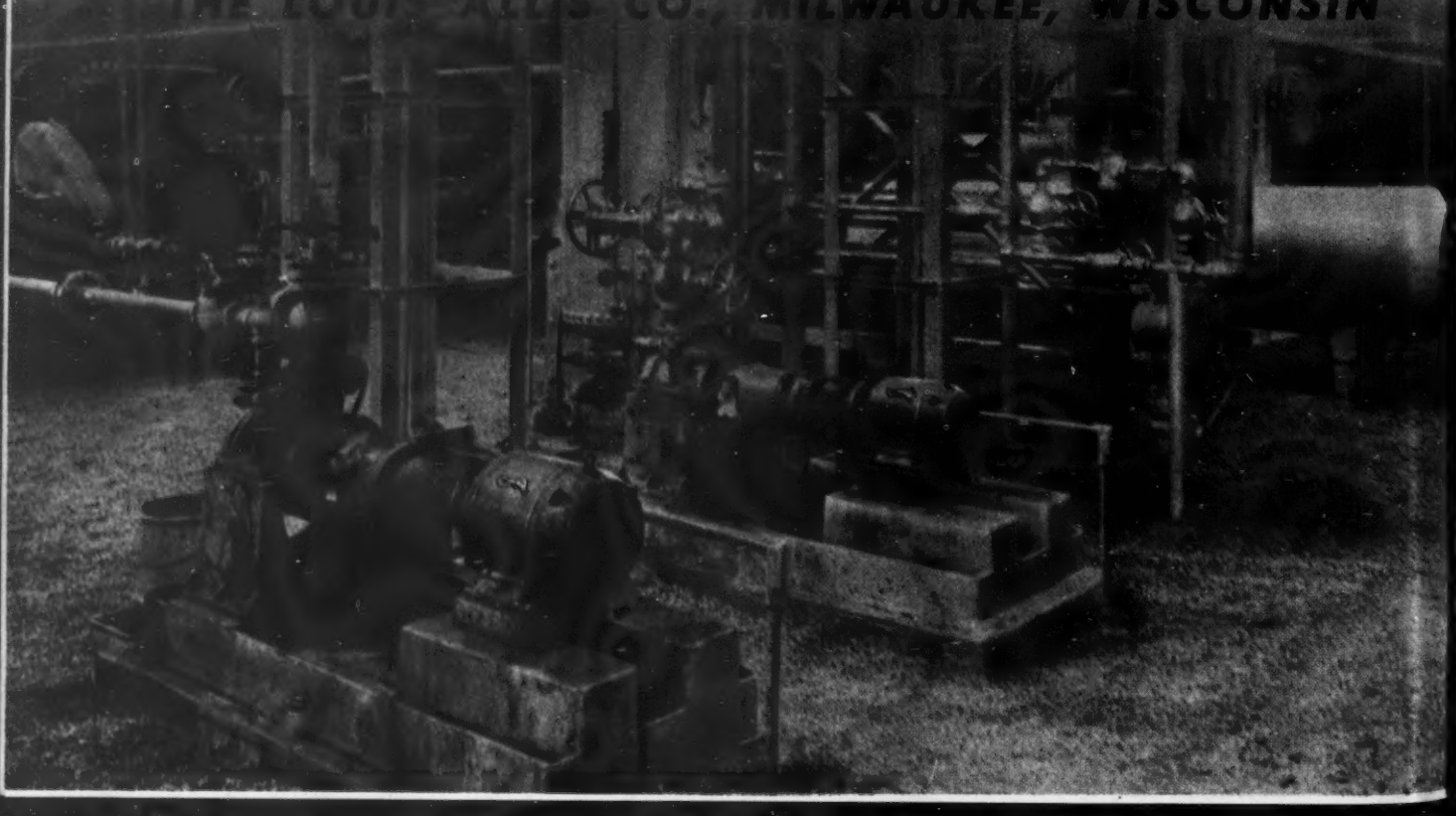
The very first fan cooled EXPLOSION-PROOF motor was originated, developed, patented and pioneered by The Louis Allis Co.

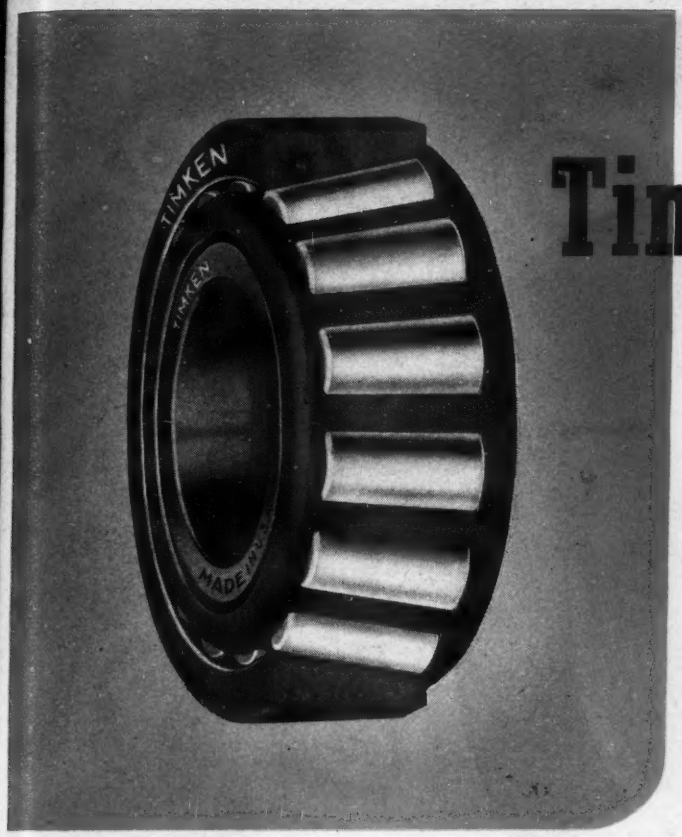
As the originator — and pioneer — The Louis Allis Co. has more actual years of manufacturing experience with this type motor than any other manufacturer —

The present Louis Allis Explosion-Proof motor now makes available a new high in electric motor efficiency, dependability, convenience, long life and SAFETY!

On your very next explosion-proof motor requirement be sure to specify by name — LOUIS ALLIS explosion-proof motor.

THE LOUIS ALLIS CO., MILWAUKEE, WISCONSIN





Timken Bearings

HELP INCREASE FOOD OUTPUT

The faster food preparation equipment operates, the greater its endurance; and the less attention it requires for lubrication and maintenance; the more it can produce. The same is true of any kind of industrial machinery—and likewise of the wide use of Timken Tapered Roller Bearings to attain these advantages.

Timken Bearings have all the qualities necessary to meet any bearing condition —or combination of conditions—in any kind of equipment. They eliminate friction; carry radial loads, thrust loads or both together in any combination; and hold moving parts in correct and constant alignment; they are made of steel developed for this purpose in the Timken metallurgical laboratories and manufactured in the Timken steel plant.

Whether you are a manufacturer or user of food preparation equipment it will pay you to see that Timken Bearings are used at every suitable position. The Timken Roller Bearing Company, Canton, Ohio.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

Prepare now to meet post-Victory competition; redesign your machines and use more Timken Bearings.

20,000,000 hp

OVER 20,000,000 horse-power bearing the Crocker-Wheeler name is serving the war effort, on land and sea.

Many of these motors and generators were built a generation ago . . . some were made in 1943. But all of them were built to stand up under *unusual conditions*.

Watching over them is a corps of carefully trained field engineers, to whom the difficult and the unusual are all in a day's work.

We can make immediate deliveries on some types . . . consult your nearest Crocker-Wheeler office, or wire us.

Crocker-Wheeler Electric Manufacturing Co., Ampere, N. J.
Division of JOSHUA HENDY IRON WORKS

Be SURE . . . with
CROCKER-WHEELER

Other JOSHUA **HENDY** IRON WORKS factories at Sunnydale, Pomona and Torrance, Calif. and St. Louis, Mo.

speedometer not needed . . .

One of the most important factors in accuracy of gun-fire today is the velocity at which a shell travels.

Formerly, variations in the structure and dryness of the powder made great differences in shell velocity . . . and hence, made accurate gun-fire correspondingly difficult.

Today—thanks to technical advances in powder-making *plus air conditioning*—there is so little variation in powder that gunners can know *exactly* what shell velocity will be. Result—a more accurate gun-fire that has already contributed to important American victories.

Air conditioning keeps powder at the correct temperature and humidity levels, not only in the making of the powder, but also in storage places ashore and in powder magazines on shipboard.

To meet exacting requirements like this, General Electric engineers have developed *air conditioning* and *industrial refrigeration* equipment that is more efficient, more compact, more flexible.

Now devoted to war, these improvements will be turned to innumerable peacetime uses when hostilities cease. Now for war . . . later for peace . . . turn to General Electric for efficient, compact air conditioning and industrial refrigeration.

☆ BUY WAR BONDS ☆

General Electric Company, Air Conditioning and Commercial Refrigeration Divisions, Section 439, Bloomfield, New Jersey.

Air Conditioning by

GENERAL ELECTRIC

Listen to the General Electric radio programs: "THE HOUR OF CHARM", Sundays, 10 P.M., E W T, on N B C . . . "THE WORLD TODAY" News, Weekdays, 6:45 P.M., E W T, on C B S

OFFICES
IN ALL PRINCIPAL
CITIES

Taylor Instrument Companies

for the home TEMPERATURE & WEATHER INSTRUMENTS *for industry* TEMPERATURE, PRESSURE, HUMIDITY, FLOW & LIQUID LEVEL INSTRUMENTS

PLANTS ALSO IN
TORONTO, CANADA
LONDON, ENGLAND

ROCHESTER, N.Y., U.S.A.

TO OUR GOOD FRIENDS IN THE FOOD INDUSTRY
who may have been unable to get all the Taylor Instruments they need.

I never thought we'd live to see the day when we couldn't help our friends out when they were in trouble. Somehow, some way, we have always found a means of supplying needed instruments. But this time it seems to be different.

If I personally could make your instruments for you, I would drop my work in the office and get at it. But even if I had the ability to do that, I would first have to put my time into completing instruments on other orders that either came ahead of yours by weeks or months, or had a higher priority than yours.

We've been doing business with the food industry of the world for over 40 years. It has been understood throughout our entire organization that some industries could — if they had to — wait a few days for their instruments, and the worst that could happen would be inconvenience and disappointment. But we knew that when the sun came out and the peas or the corn ripened, the canner had to have instruments and he depended upon us to manufacture and supply them.

We haven't forgotten this. We are doing all that any company or any individual can do, but in your case it probably seems like doing nothing.

We are sorry. We can only hope that your difficulties as a result of our occasional failure to get these instruments in your hands will not be too costly to you.

Sincerely,

Fred K. Taylor

Fred K. Taylor
Vice President

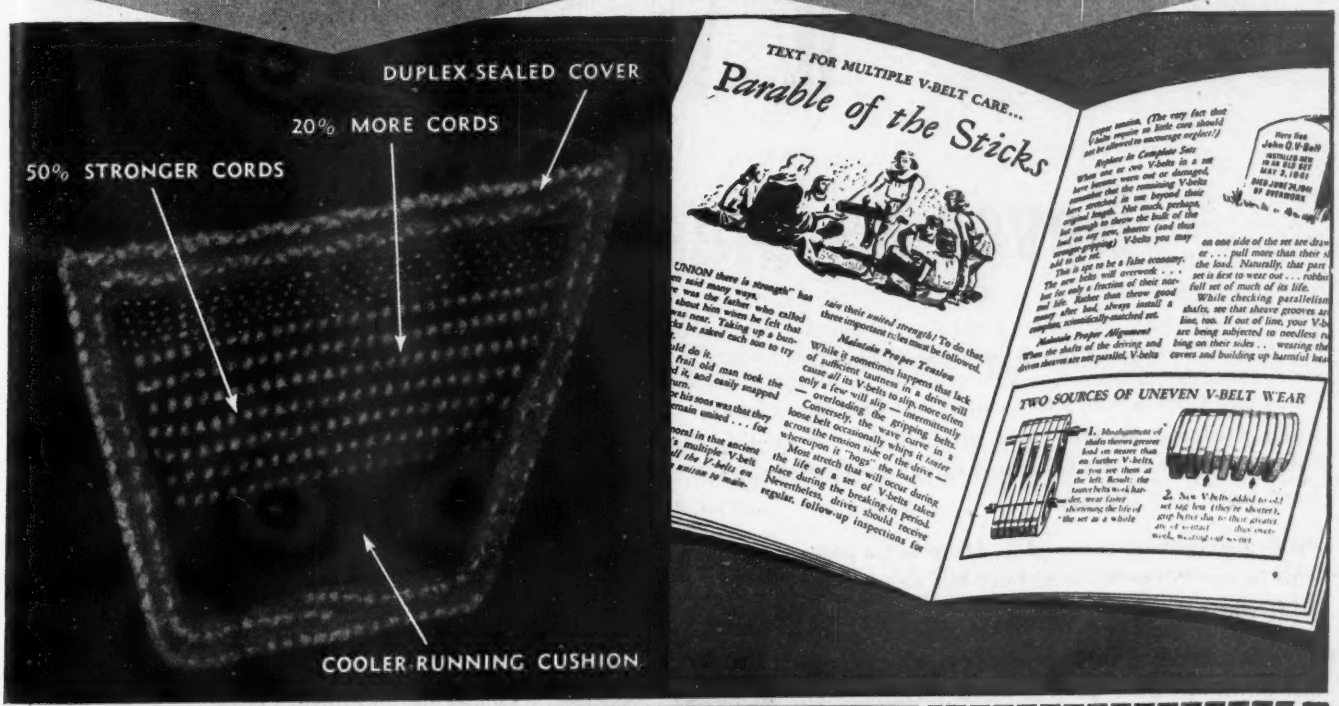
P.S. It's not a day too early to get your order in for next season's requirements. This will help deliveries more than anything else either of us can do.

TAYLOR INSTRUMENTS MEAN ACCURACY FIRST

HERE'S NEW Double-Trouble for V-Belt Wear!

1 BUY THE BEST BELTS: You'll get the "jump" on maintenance with Texrope Super-7's design-against-wear construction! 20% *more* pulling cords. 50% *greater strength* in every one because they're made by the special Flexon process. That adds up to extra pulling power, less stretch. A cool-running rubber cushion fights flexing heat. Tough Duplex-Sealed cover seals belt against grit, grime, and moisture. When you *do* need new belts *invest in the best* — Texrope Super 7!

2 USE THE BEST CARE: Over 75,000 men in industry are getting a head start on longer V-Belt life because they've got Allis-Chalmers' new handbook: "Plain Facts on Wartime Care of Rubber V-Belts." It gives you the inside story on "how V-belt anatomy affects maintenance"... "good-rule-of-thumb for tension"... a lot of other tips. Excellent for training new men, it's packed with valuable data. For your *free* copy, tear off the coupon and send today.



ALLIS-CHALMERS

TEXROPE SUPER-7 V-BELTS

WE WORK FOR VICTORY — WE PLAN FOR PEACE

Trade mark registered U. S. Patent Office. Texrope Super-7 V-Belts are the result of the cooperative research and design genius of two great companies—Allis-Chalmers and B. F. Goodrich—and are sold exclusively by Allis-Chalmers. Available in all sizes.

ALLIS-CHALMERS MFG. CO.
Milwaukee, Wisconsin

Gentlemen:

Yes, I would like to receive free of charge a copy of your "Plain Facts on Wartime Care of V-Belts".

(Name)

(Title)

(Company)

(Street Address)

(City and State) A 1628-5

ALL THIS TALK ABOUT QUICK FREEZING IS FINE . . . BUT OUR WORRY IS QUICK REPAIRS OR OUR REFRIGERATION PLANT WILL FOLD UP

HERE'S THE QUICK ANSWER TO THAT PROBLEM . . . WPB'S REVISED LIMITATION ORDER AND HELP FROM WORTHINGTON

Never as Black as it Looks

Trying conditions—but there's usually an answer to every problem. It's just one of our jobs to help find it.

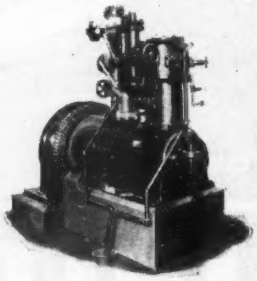
Even with Government's first call on our time and manufacturing facilities, we still must give aid to our vital food industries. At all costs they must carry on—essential equipment must keep operating.

Plant management can help by bringing its problems to us. We're never so busy but we can give a lift where needed.

If it's repair parts, we'll turn our organization upside down—produce them or locate them for you.

WPB is giving all possible aid; we'll do our utmost to provide the rest. If it's maintenance service, engineering consultation—or even new equipment, which we still can deliver under favorable priorities—let us know and we'll go into action at once.

And here's the *silver lining*—black as the cloud has seemed, this emergency has taught us many things. We've made great strides forward with new designs to help you meet post-war needs. At least we can talk about them with you now for your future planning and guidance. **Worthington Pump and Machinery Corporation,** Harrison, New Jersey. Offices also in principal cities. CA 3-36



Worthington 10 x 10 Vertical Ammonia Compressor with direct-connected synchronous motor.

WORTHINGTON

Refrigeration

AND AIR CONDITIONING

"Vitamin Y" Puts New Pep in Steam Equipment

PERHAPS you've never heard of Vitamin Y. For the sake of this message, it stands for Yarway Impulse Steam Traps. But you have heard of Gelatin Products Company of Detroit—world's largest producer of soft, elastic gelatin capsules, and big factor in the production of the health and energy-giving vitamins which hold the center of the stage in public interest today.

And here is the connection. A Yarway representative in this company's territory writes: "A year or so ago they started using Yarway Traps after they had been called to the attention of the Fine Chemical Div. Soon they were using them exclusively in this division and throughout the rest of the factory.

"They like them for their ability to work on any varying pressure, their freedom from air-binding and their compactness. Much of their equipment is small and the piping complicated. Yarways go in especially well.

"In all, they have over a 100 Yarways at work on heaters, stills, reaction kettles, unit heaters, etc.

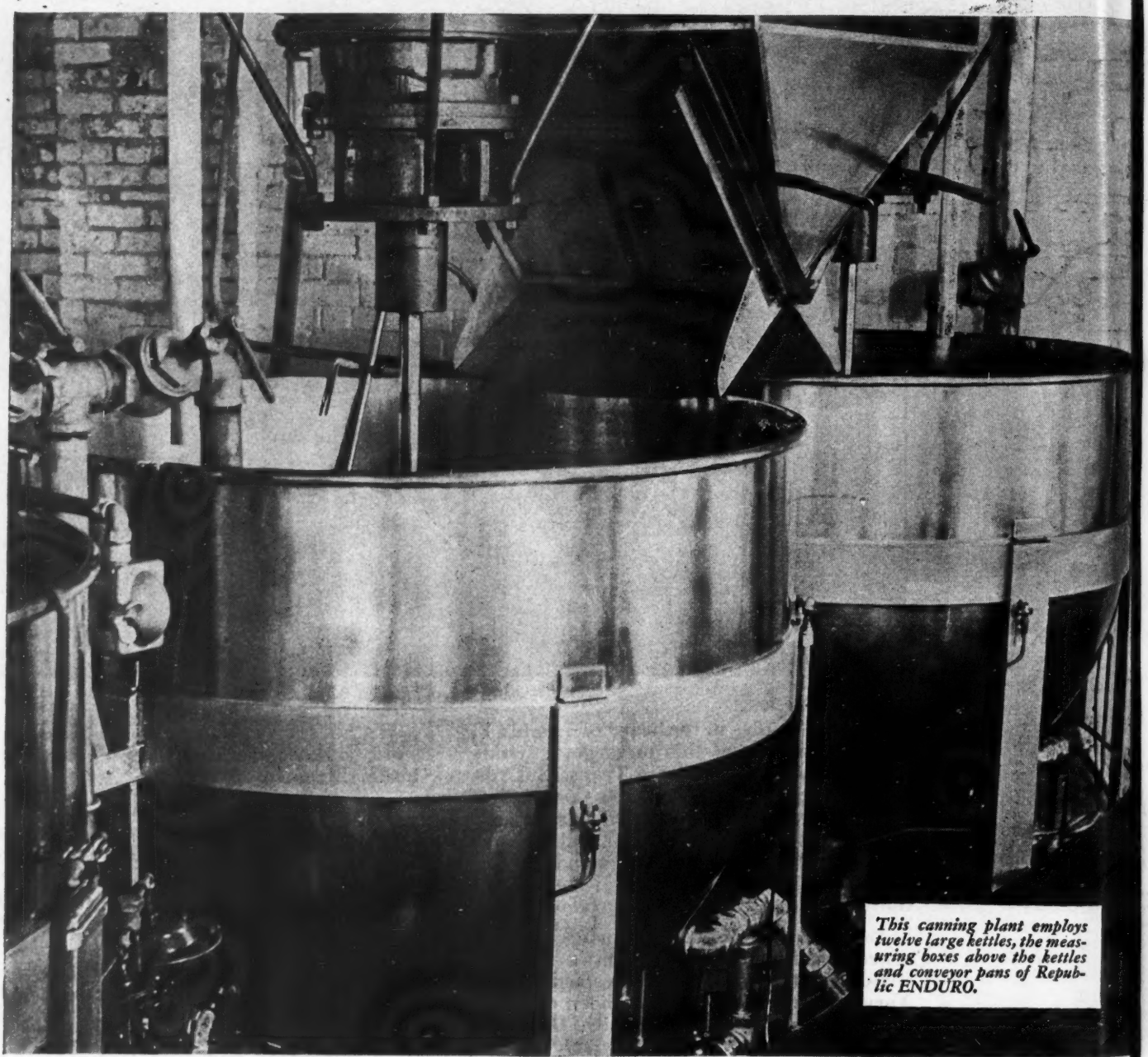
"It would seem to me that we might play up the copy on the vitamin angle—vitamins to increase energy in the human body—Yarways always to increase the energy received from steam, etc., etc. With some thought we could make a catchy ad from this copy."

We think so too, but he could have mentioned that Yarway Impulse Traps usually cost no more to buy, than to repair an ordinary trap. Also that more than 250,000 have been purchased and over 100 convenient Mill Supply Distributors carry them. Why don't you see your supply house or write for Bulletin T-1737.

YARNALL-WARING COMPANY
127 Mermaid Avenue, Philadelphia 18, Pa.

YARWAY IMPULSE STEAM TRAP

...and Pass



This canning plant employs twelve large kettles, the measuring boxes above the kettles and conveyor pans of Republic ENDURO.

REPUBLIC *Enduro*

*Reg. U. S. Pat. Off.

Other Republic products include Ex-L-ite Tin Plate—Pipe—Sheets—

the Ammunition

FOOD IS AMMUNITION—A FRONT LINE WEAPON OF WAR—AND ENDURO WILL HELP YOU PRODUCE MORE OF IT

It's a big job, Mr. Food Processor—a tremendous job. You must feed the folks at home—our boys in uniform here and abroad—to say nothing of our Allies and the starved peoples of Europe once they are freed from the yoke of Nazi slavery.

But it's not an insurmountable problem—not to American ingenuity, methods and equipment—the finest in the world.

Much of that equipment is made of Republic ENDURO Stainless Steel—the metal with the strength of steel and the sanitation of glass. And wherever it is installed, you will find it on the job day after day helping to increase the output of processed meat, vegetable, fruit and dairy products.

ENDURO is remarkably easy to clean—thus saving time between batches. In most cases flushing with water and wiping are sufficient. The use of ordinary cleaning compounds will not mar or harm its hard, smooth surface in removing greases or sticky substances. There's nothing to wear off.

Fruit, vegetable and meat juices do not affect ENDURO—neither does it have the slightest effect upon the flavor, color or composition of foods.

And, with proper care, ENDURO lasts for years—minimizes down-time for repairs or replacement—affords more time for productive operation. Write us and we'll send you a wall card giving suggestions for lengthening its life.

ENDURO is scarce—but if you can qualify with the proper priority, we are ready to supply it to help produce more food—one of war's most essential weapons.

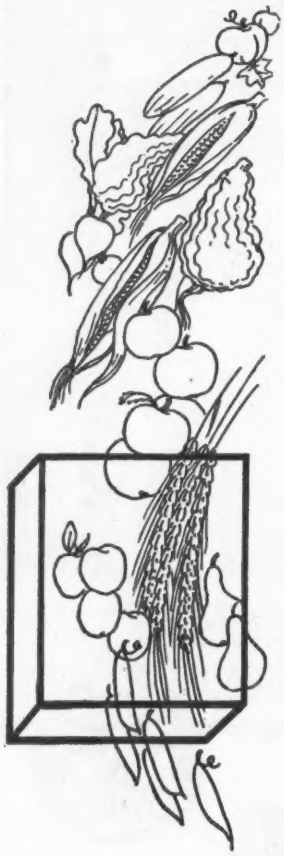
Casing bins, cutting pans and perforated tables of easy-to-clean Republic ENDURO in a nationally-known meat packing plant.

REPUBLIC STEEL CORPORATION
Alloy Steel Division, Dept. FI
Sales Offices • Massillon, Ohio
GENERAL OFFICES • • CLEVELAND 1, OHIO
Berger Manufacturing Division • Culvert Division
Niles Steel Products Division • Steel and Tubes Division
Union Drawn Steel Division • Truscon Steel Company
Export Department: Chrysler Building, New York 17, New York

STAINLESS STEEL

Upson Bolts, Nuts and Rivets—Electrunite* Condenser and Heat Exchanger Tubes.

WHEN THE FARMER'S JOB IS DONE...



THE farmer . . . like his fellow Americans in industry and commerce . . . is working to increase his production in every way. Food is a weapon of war and the growing of food and still more food is an important duty to our country. But when the farmer's job is done, we must rely upon the resourcefulness of the processors and packers of food so that the fruit of his labor may be properly preserved . . . ready for consumption whenever and wherever needed.

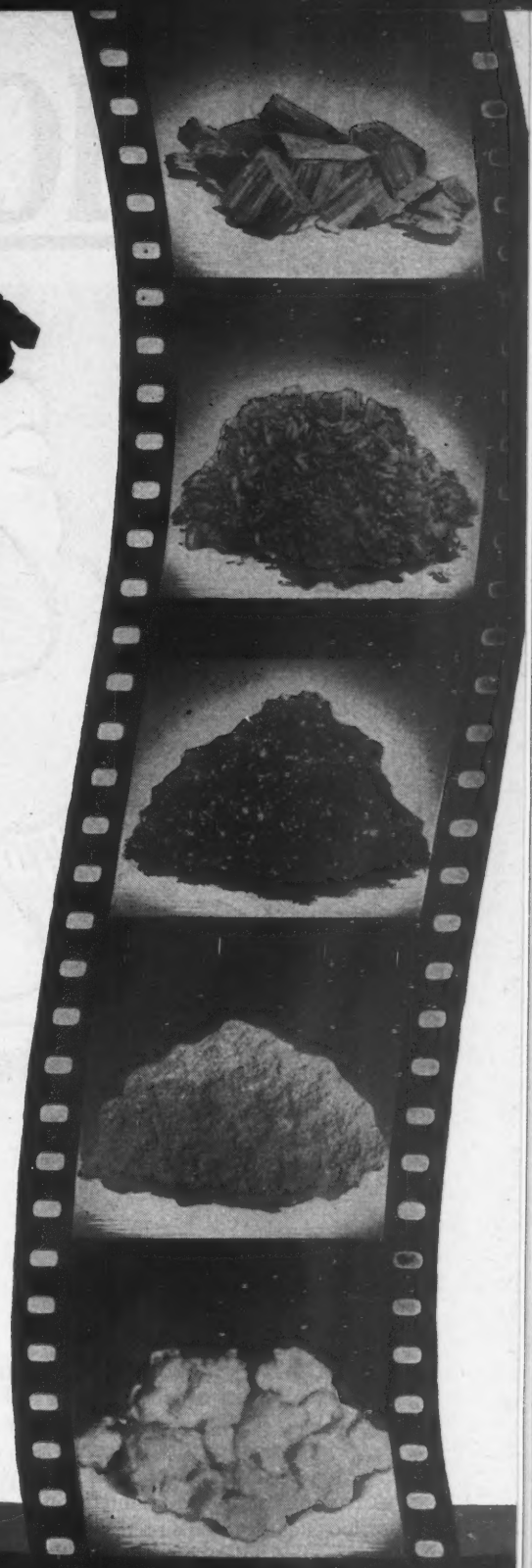
The scarcity of some materials has made this task difficult, but not impossible. Hundreds of new packaging ideas have been developed to meet present needs by manufacturers of paper, folding cartons, tubes, bags, and containers of all types. Our own research staff has perfected many such ideas, and our great mill at Milford, N. J., is given over almost entirely to special papers for the food industry.

Increased demands and limitations on production now make our acceptance of new business almost impossible. However, if you have a problem in the protective packaging of food, you may be sure that there is someone, somewhere, who can solve it. We keep in close touch with the new developments of leading suppliers in all fields, and we can often still serve you by finding some alternate solution to your requirements. Requests for information and advice will always continue to receive our cooperative and intelligent attention.

RIEGEL PAPER CORPORATION

342 MADISON AVENUE • NEW YORK 17, NEW YORK

FROM THIS SIZE *any* OF THESE . .



with SPROUT, WALDRON Equipment for Controlled Grinding

SPROUT, WALDRON Crushers, Cutters, Attrition Mills, Burr Mills, Roller Mills, Hammer Mills and other basic types of grinding equipment provide you with the opportunity to select either special-purpose or highly versatile units that give you closely controlled size reduction—all the way from coarse granulation to fine pulverizing.

Nowhere else can you find so many basic types of grinders in one manufacturer's line, nor so well supported by seasoned experience and fresh, courageous vision to be applied to the constant succession of today's (and tomorrow's) process problems.

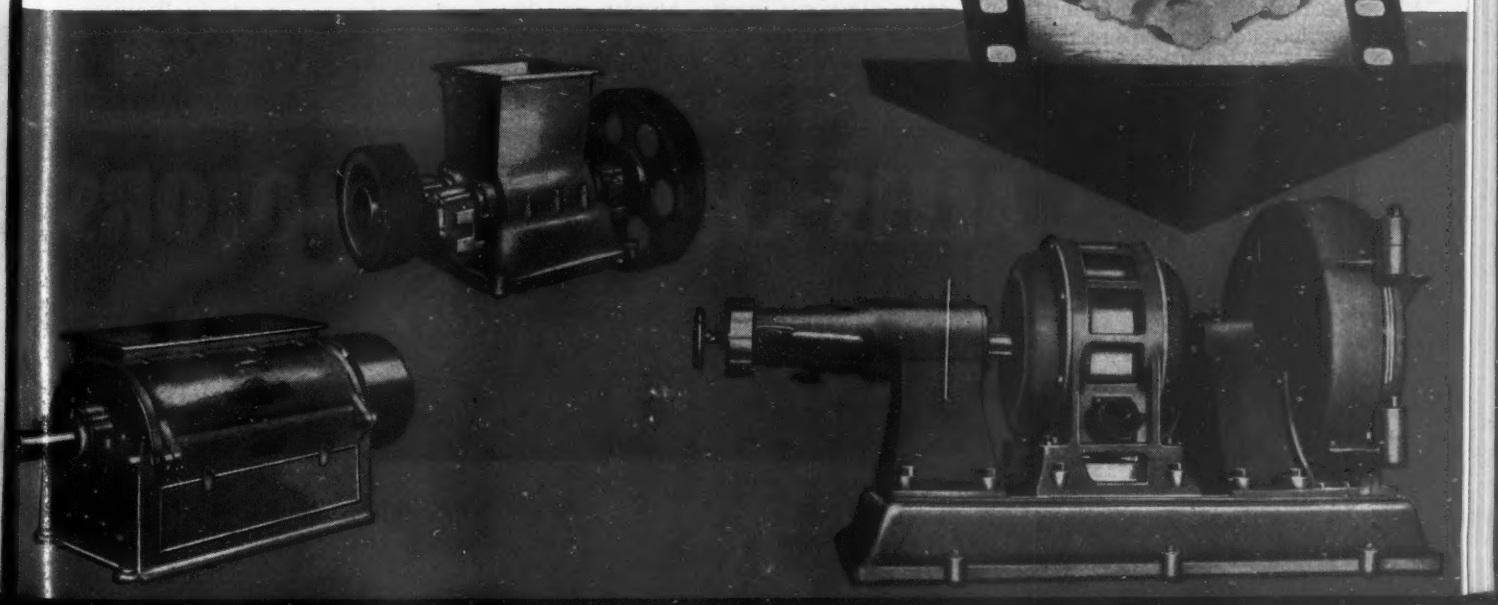
More than five thousand test runs in SPROUT, WALDRON's Experimental and Proving Department have built up a remarkable reference library of problems solved in crushing, cracking, defiberizing, grinding and pulverizing, in mixing, blending, sifting, classifying and material handling and other allied functions in mechanical processing.

SPROUT, WALDRON processing equipment is briefly and concisely described in Bulletin 1234.

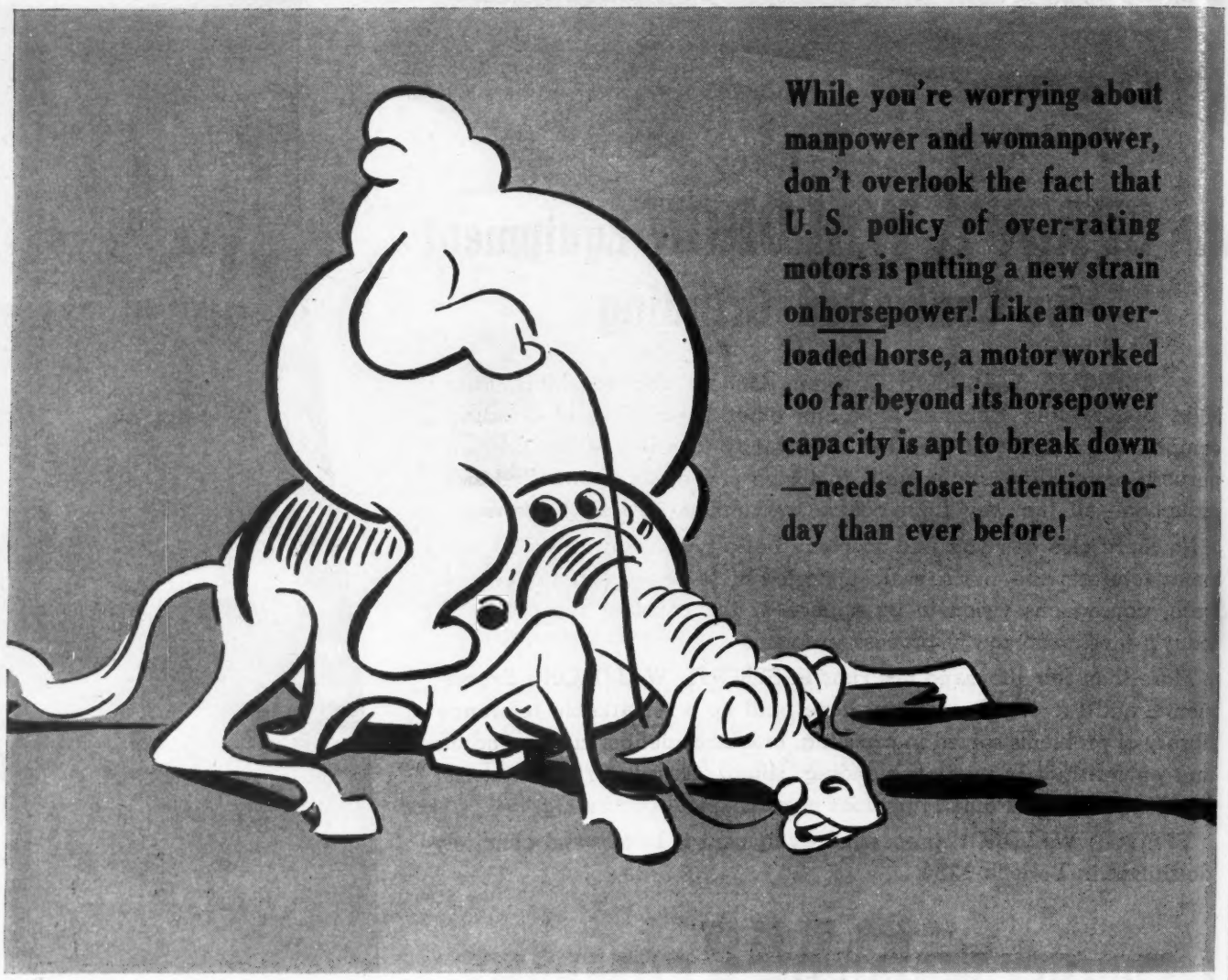
SPROUT, WALDRON & COMPANY

Designers, Engineers and Manufacturers of Process Machinery

162 SHERMAN STREET MUNCY, PENNSYLVANIA



DON'T FORGET HORSEPOWER!



While you're worrying about manpower and womanpower, don't overlook the fact that U. S. policy of over-rating motors is putting a new strain on horsepower! Like an overloaded horse, a motor worked too far beyond its horsepower capacity is apt to break down —needs closer attention today than ever before!

WHAT WAS GOOD motor maintenance in peacetime, just isn't good enough today! Many motors are working *3 and 4 times* as many hours a week today . . . need wartime care . . . the kind set forth in Allis-Chalmers' new "Guide to Wartime Care of Electric Motors." This interesting, *fully illustrated* book looks at motor maintenance from a *new* perspective . . . describes in detail the 9 main enemies of motor life . . . tells you where to look for them, how to fight them. To experienced men it will serve as a valuable "refresher" . . . to new employees, as a *valuable training course.*

Over 100,000 copies are in use by the armed forces and war industry. World-wide demand has necessitated Spanish and Portuguese editions! "Guide to Wartime Care of Electric Motors" is *free!* Write for your copy. ALLIS-CHALMERS, MILWAUKEE 1, WIS. A 1639

ALLIS-CHALMERS MOTORS
When you do need new motors, look into the strength, solidity and all-around protection of the new "Safety Circle"—protected top, sides, ends and bottom.
A-C
WE WORK FOR VICTORY
WE PLAN FOR PEACE

A Tale of Two Oranges

—with a postwar hint to packagers

THE TEST. Two groups of choice oranges from the same grove were stored in the same place, at room temperature, for four months. One group was sealed in individual wrappers of Goodyear's moisture-air-tight Pliofilm. The other group was unwrapped. The photographs above show what happened.

THE OFFICIAL REPORT, from the Agricultural Experiment Station of the University of Florida which made the test: *"The oranges wrapped in Pliofilm lost less than 2% of their initial weight after four months' storage...the original taste and appearance of the fruit were unchanged . . . Vitamin C content very slightly diminished."*

Comparable results have been obtained in tests with grapefruit, lemons, apples, peaches, mangoes and many vegetables!

THE SUGGESTION. While Pliofilm is not available now (today it is a 100% war worker), marketers are invited to consider Pliofilm as a quality safeguard in postwar packages because the enduring "keep fresh" protection of Pliofilm functions equally well in packaging cheese, meat loaf sausage, coffee, nuts, pharmaceuticals, chemicals and other air-moisture-sensitive products. Write: Pliofilm Sales Dept., Goodyear, Akron, Ohio.

GOODYEAR
THE GREATEST NAME IN RUBBER

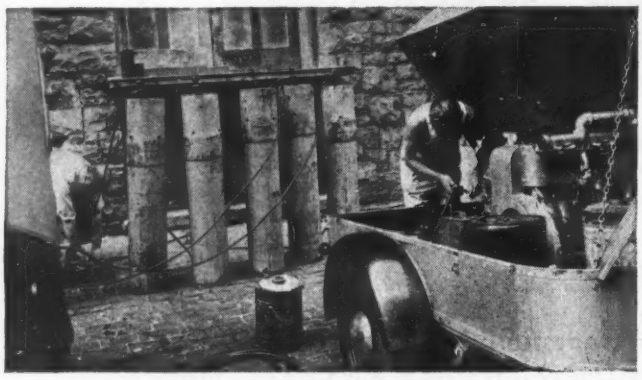
Pliofilm

Pliofilm - T. M. The Goodyear Tire & Rubber Company

Liquid HCN Assures Complete, Speedy Mill Fumigation with or without "Clean-Up"

1. EQUIPMENT FOR A FAST, THOROUGH FUMIGATION JOB with Liquid HCN is contained in these two compact trailers. You can use this powerful, economical fumigant *with* "clean-up" in standard doses of 8 oz. per 1000 cu. feet or *without* "clean-up" in doses only about 50% greater.

2. WHERE INFESTATION IS WORST, such as in flour siftings at the bottom of an elevator boot, extra rubber hose is added to the manifold of the temporary hose or permanent piping system and Liquid HCN applied directly to the "trouble area." It kills insects in every stage of their life cycles, insuring complete control.



3. APPROXIMATELY 200 POUNDS OF PRESSURE are sent through the cylinders of Liquid HCN by this air compressor. Liquid HCN fumigation reaches all possible infestation areas, is adaptable to all conditions and all types of mills and warehouses. And it is economical and convenient to use.

4. SIGNS OF SABOTAGE are these beetle tracks in a bin where flour is ground. To assure complete freedom from such costly infestation of vital foodstuffs, have your mills and warehouses fumigated *regularly* with Liquid HCN by an Industrial Fumigation Engineer. He will give you an economical and efficient job.

Nothing has been found to equal Liquid HCN for simplicity and effectiveness in fumigation. By means of an inexpensive piping or a temporary hose system, every piece of milling equipment is fumigated directly at one time. All stages of insect life cycles are controlled—in less than 24 hours. Liquid HCN is the most economical method of insect control. It is harmless to products and equipment, safe, rapid and adaptable. It affords maximum kill at minimum cost.

To assure the most satisfactory fumigating results, call in an Industrial Fumigation Engineer. We will be glad to recommend a competent organization in your vicinity without obligation.

FOR MORE INFORMATION ON FUMIGATION FOR INSECT AND PEST CONTROL WRITE FOR FREE MANUAL

AMERICAN CYANAMID
& CHEMICAL CORPORATION
(A Unit of American Cyanamid Company)
INSECTICIDE DEPARTMENT
30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y. • KANSAS CITY, MO. • AZUSA, CALIF.

DON'T WAIT – FUMIGATE!

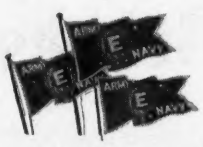
Compressed Air for automatic control

The increasing application of pneumatic control is recognition of its many advantages—reliability, simplicity, safety, and ease of maintenance. Automatic pneumatic control is one of the cornerstones of continuous processes, and without it many process industries could not operate.

Here is another striking example of the utility of compressed air power. It may suggest to you a means of solving many of your problems by applying air—the power medium for countless jobs which cannot be done as well, if at all, by any other method.

Ingersoll-Rand has pioneered compressed air systems since 1871, always supporting and developing new and time-saving applications. Our engineers will be glad to cooperate with you. Ingersoll-Rand Co., 11 Broadway, New York, N.Y.

BUY WAR BONDS AND STAMPS

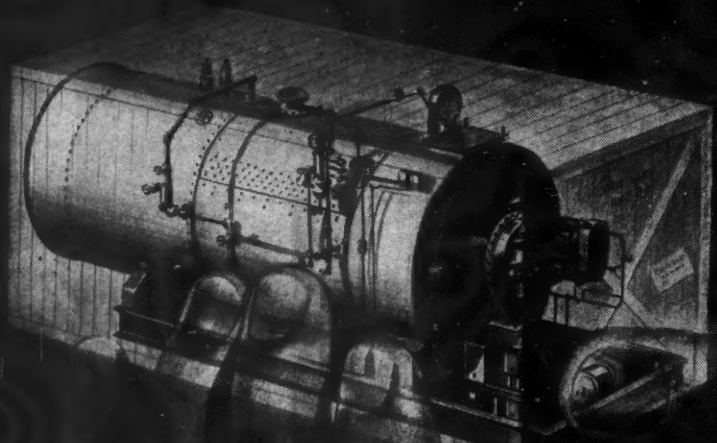


Ingersoll-Rand

1-335

COMPRESSORS • TURBO-BLOWERS • ROCK DRILLS • AIR TOOLS • OIL AND GAS ENGINES • CONDENSERS • CENTRIFUGAL PUMPS

★ CENTRALIZED RESPONSIBILITY ★ OPERATING ECONOMY
★ ONE SOURCE OF SUPPLY ★ SPEED OF INSTALLATION



THE MILITARY SERVICES AS WELL AS INDUSTRY RECOGNIZED THE ADVANTAGES OF *"Factory-Packaged"* STEAM GENERATORS

In military bases at home and remote advance bases abroad, Cleaver-Brooks steam generators are delivering the same dependable 'round-the-clock performance for which they are noted in scores of essential war industries.

Quick steaming capacity — minimum manpower required for operation and maintenance—cleanliness, no smoke, ashes, clinkers — compact, space-saving design — simple, low-cost installation — efficiency (saving shipping and storage of fuel) — a complete "package" — factory-finished and tested in every detail — these advantages of Cleaver-Brooks oil-fired steam generators were quickly recognized by military authorities. Centralized responsibility for dependable manufacture — a single, reliable source of supply and maintenance — were added factors that won preference for Cleaver-Brooks steam generators.

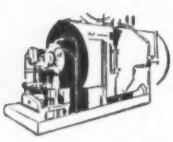
Steam generators are only one of several types of equipment being built by Cleaver-Brooks for wartime needs. Mobile water distilling, disinfecting and sterilizing units, portable shower-bath units, bituminous heating equipment embody the same efficient principle of oil firing.

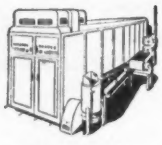
The engineering competence and manufacturing skills which have qualified us to serve our government and essential industries today . . . will be devoted to the building of equally efficient equipment for tomorrow.

CLEAVER-BROOKS COMPANY
5103 N. 33rd STREET MILWAUKEE 9, WIS.

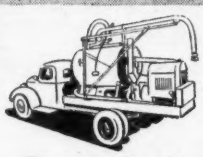
Cleaver-Brooks
STEAM GENERATORS

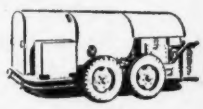
CLEAVER-BROOKS PRODUCTS INCLUDE:


Steam Generators


Food Dehydrators

Tank Car Heaters


Bituminous Boosters


Special Military Equipment

The can that Russia rates above guns and planes

A LEND-LEASE AUTHORITY said recently that Russia has been giving our food shipments even higher priorities than guns, planes or tanks!

Most food is going to war in cans—whether it's prepared, dehydrated or dried. And whether it's going to Russia, Britain, China or to our own fighting men all over the world.

Did you realize that our soldiers have a dozen different combat rations—and that most of these are packed in cans?

Without the tin can, lend-lease and military supply would fail. The can is as tough as the Russians. It endures the cold of Iceland, the heat of Africa. It can be stored anywhere, even outdoors.

The can saves food from contamination in bombed areas. It can be dropped without harm to beleaguered forces. And it keeps out water, light, dirt, gas and insects.

Cans for civilians are limited now, but the war cans will be peace cans one day. And better cans! We are learning plenty as "Packaging Headquarters for America at war."

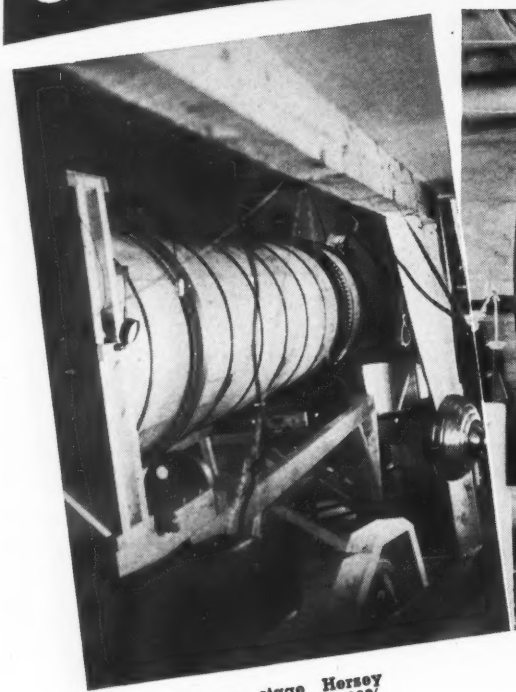
TO MAKERS OF WAR GOODS

Rushed as we are, we can still take on more war work. A part of our vast metal-working facilities for forming, stamping, machining and assembly is still available. Write or phone our War Products Council, 100 E. 42nd St., N.Y.C.

CONTINENTAL CAN COMPANY

HELP CAN THE AXIS
—BUY WAR BONDS

Continuous! Automatic! No Labor!



(a) Primary stage Hersey Dehydrator removing 66% of the moisture.

(b) Four finishing stage Hersey Dehydrator.

(c) Dried potatoes being discharged from a finishing stage Dehydrator.

HERSEY
VEGETABLE DEHYDRATOR

For potatoes, carrots, beets and all root vegetables

CONTINUOUS IN OPERATION taking the product in continuous flow from the last washer and discharging without further attention to the packaging room

COMPLETELY AUTOMATIC in movement of product, temperature control and cycle time NO OPERATORS NEEDED

UNIFORM TREATMENT because the product is in motion and is being turned over constantly Every particle receives exactly the same treatment

Constructed of

NON - STRATEGIC MATERIALS such as wood, cast iron, etc., wherever possible

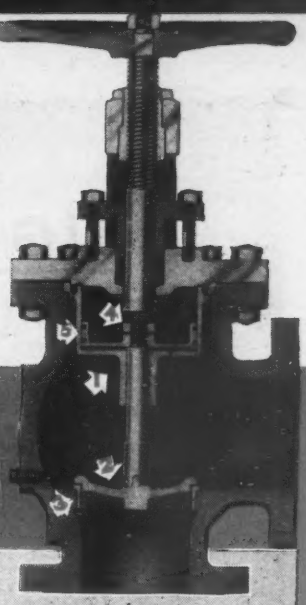
• ***Send for Catalog Today***

HERSEY MANUFACTURING CO.

DRYING ENGINEERS FOR MORE THAN 60 YEARS

381 E STREET • SOUTH BOSTON, MASS.

Prevent Valve Failure *before it starts!*



NEGLECT RUINS A VALVE VITAL TO SAFETY...

Creates dangerous threat to life and property

To End Hazards and Prevent Production Slowdown — give your non-return "Stop" Valves constant care . . .

Important for safe operation is the automatic Non-Return Valve for steam boilers. The A.S.M.E. Code, and State regulations, call for two "stop" valves between boiler and header, one of these being a Non-Return valve.

When operating properly, the piston of the Non-Return valve "floats" and "suspends" the disc in proper relation to the steam flow, and effectively cushions the moving parts. When the boiler pressure drops below that of the rest of the system, or an emergency occurs –such as the rupture of a boiler tube– the Non-Return valve should be ready to close instantly to safeguard workmen who may have entered the boiler to clean or repair it.

The simplified design and rugged construction of a Jenkins Non-Return Valve assures faultless operation over a long period, *providing strict rules of maintenance are observed.* The piston and cylinder must be kept clean and properly lubricated, to maintain compression. If not, the destruction of working parts will progress rapidly. The ruined parts illustrated had been in service more than three years without attention.

Inspect, clean and lubricate Non-Return valves at least once a year, more often when conditions are unfavorable.

To avoid needless interruptions and save vital war material, make sure all your valves are inspected regularly, systematically. Replace worn parts. Instruct maintenance workers thoroughly. Select valves for new installations carefully; install them properly. Jenkins Engineers will provide any assistance you need in preparing an effective system of valve conservation.

Jenkins Bros., 80 White Street, New York, 13, N. Y.; Bridgeport, Conn.; Atlanta, Ga.; Boston, Mass.; Philadelphia, Pa.; Chicago, Ill.; Jenkins Bros., Ltd., Montreal; London, Eng.

1... DASH POT . . The piston rod guide, or bearing, at the base of the dash pot (cylinder) has been greatly enlarged by abrasive wear and vibration, losing all compression under the piston. With the consequent unchecked agitation of the parts in the steam-flow, destruction progressed rapidly.

2... DISC . . It was ruined beyond repair by constant hammering when compression failed. The piston rod, integral with the disc, is worn to less than half its original diameter.

3... SEAT RING . . Seating surface was battered to complete destruction. The shoulder of the seat ring was hammered to a paper-thin edge by the continual pounding of the disc on the seat face.

4... PISTON NUT . . This part became loose from vibration after loss of compression. Though provided with a lock washer, it unscrewed with the piston.

5... PISTON . . Because abrasive sediment collected in the cylinder, and because lubrication was neglected, the piston rings were badly worn and "seized" in the grooves. Compression became progressively less efficient, – was eventually lost completely, allowing the various parts to be battered by the pulsations of the steam flow.

JENKINS VALVES

SINCE 1864

For every industrial, engineering, marine and power plant service . . . in Bronze, Iron, Cast Steel and Corrosion-Resisting Alloys...125 to 600 lbs. pressure.

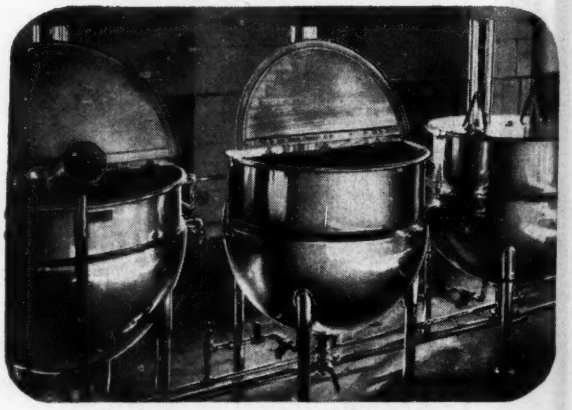
EIGHT ASSETS OF *Stainless Steel* FOR FOOD EQUIPMENT

Stainless steel milk pasteurizers can be taken apart for easy cleaning to comply with community dairy codes.

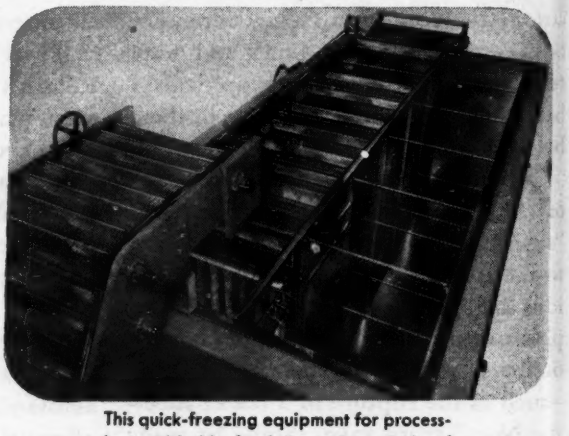
Both practical application and scientific research support the use of stainless steel for food equipment. Stainless steels have eight important advantages to the food processor:

1. Stainless steels eliminate metallic contamination. Food flavors and colors are protected. Spoilage is reduced.
2. Stainless steels are easy to clean. They are not affected by sterilizers. Their smooth, polished surface repels dust and dirt.
3. Maintenance is reduced to a minimum. Stainless steels resist food acids. They will not scratch easily. They will not discolor or rust.
4. Stainless steels have long life. They resist continuous high temperature at high pressures. Because they are stainless throughout, there is no coating to chip or wear away.
5. Stainless steel equipment is easily fabricated. The welded seams eliminate joint crevices that are hard to clean.
6. Stainless steels resist abrasion from grain.
7. Stainless steel equipment can be made both strong and lightweight, easy to handle.
8. The permanent luster of stainless steel equipment is especially valuable in a food-processing plant where the appearance of equipment contributes to the overall picture of cleanliness and purity.

We do not make stainless steel, but we produce the ferrochromium that makes steel stainless. With a knowledge accumulated from 35 years of experience with alloy steels, our metallurgists can give you impartial advice on the selection or use of a stainless steel for your job. For information on stainless or other alloy steels, consult us.



Stainless steel cooking kettles help to assure pure and uniformly flavored foods.

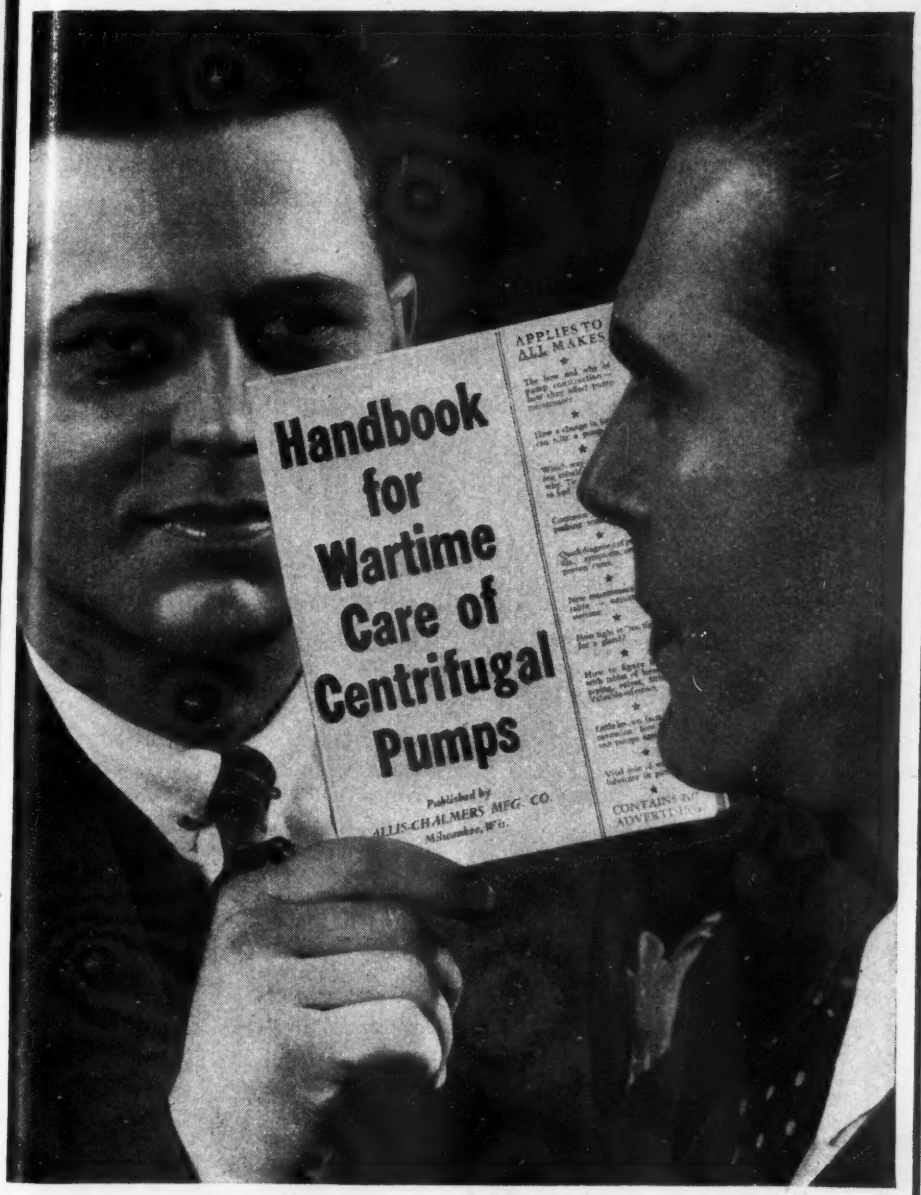


This quick-freezing equipment for processing perishable foods is made entirely of stainless steel to help protect the flavor, color, and nutritive value of the food.

ELECTRO METALLURGICAL COMPANY
Unit of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario

Electromet
Trade Mark
Ferro-Alloys & Metals

Pump Book Makes News!



HOW TO MAKE EQUIPMENT WORKING ROUND THE CLOCK LAST IS INDUSTRY'S MOST DISCUSSED SUBJECT. MOST DISCUSSED BOOK IS A-C'S NEW PUMP MAINTENANCE GUIDE!

NOW THAT PUMPS are working 2 and 3 times as many hours a week as in peacetime, *they need wartime care* . . . the kind set forth in Allis-Chalmers new "Handbook for Wartime Care of Centrifugal Pumps"!

By building a pump on paper, this new handbook takes a *fresh* look at pump anatomy. Contents include new preventive maintenance tips, a guide to spotting trouble, a new *war* timetable for pump care, valuable tables. Tear out the coupon below and send in now for *your* free copy!

Contains no advertising— applies to all makes — copies mailed free of charge. Use it to make present pumps last. And when you *do* need new pumps, look into the extra efficiency, ruggedness and long life of Allis-Chalmers centrifugal pumps — the famous "Electrifugal" . . . and all types for every purpose.

ALLIS-CHALMERS
MILWAUKEE

WE WORK FOR VICTORY — WE PLAN FOR PEACE

ALLIS-CHALMERS MFG. CO.
Milwaukee, Wisconsin

Gentlemen:

Yes, I would like to receive *free of charge* a copy of your "Handbook for Wartime Care of Centrifugal Pumps".

(Name)

(Title)

(Company)

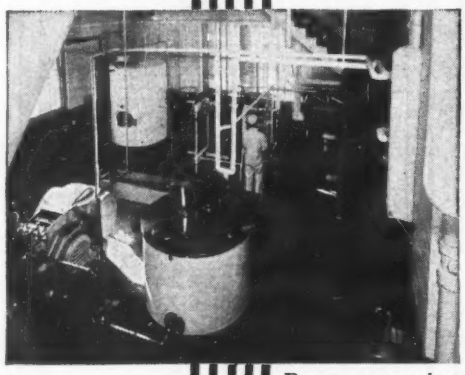
(Street Address)

(City and State)

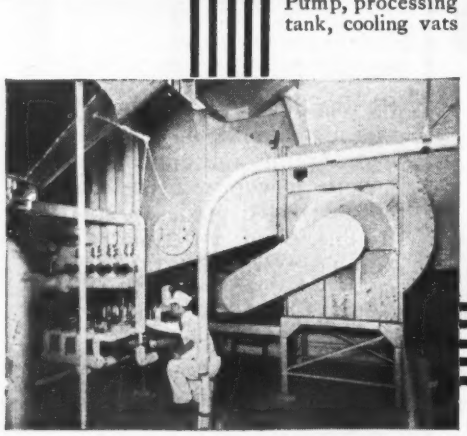
A 1582-7

Two Leaders Consolidate Their Resources to Serve You Better

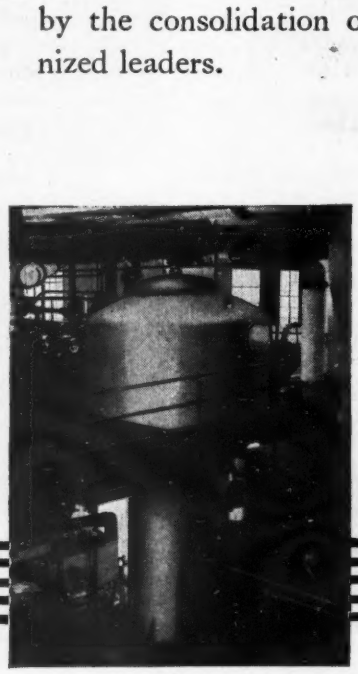
Douthitt Gray-Jensen Spray Dryer



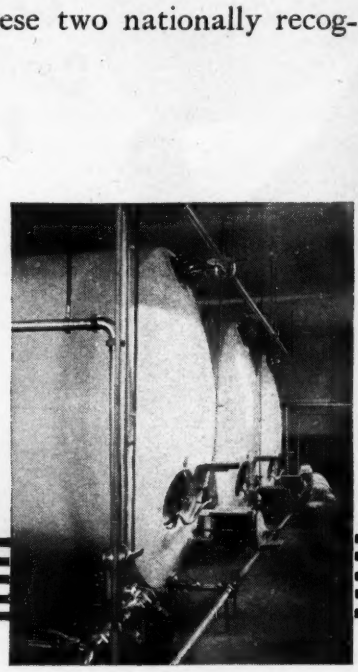
Pump, processing tank, cooling vats



Fan supplies air for drying chamber



Swenson Evaporator, LTV Type

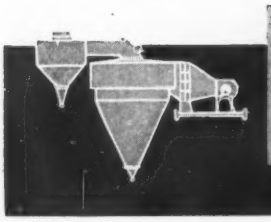


Fluid milk storage tanks—insulated

THE merger of Douthitt's engineering and production facilities with those of the Swenson Evaporator Company makes available evaporation and spray drying equipment backed by the skill and experience of two great organizations.

Swenson Evaporators have been noted for efficiency and low-cost operation for nearly sixty years. Douthitt Gray-Jensen spray drying systems have given long and highly satisfactory service in the drying of numerous food products.

In meeting your future equipment needs, it will pay you to secure the double advantages made possible by the consolidation of these two nationally recognized leaders.



DOUTHITT GRAY-JENSEN

SWENSON EVAPORATOR CO. DIVISION of WHITING CORPORATION

221 No. La Salle St., Chicago 1, Ill., U. S. A.

EACH A "BLUE RIBBON" WINNER

...but ONE is "BEST IN THE SHOW" for You

Packaging requirements in varying industries are widely divergent. With some packers greyhound-swift production takes first place. Others look for speedy operation with true scottie economy; while still others want inexpensive, bulldog-grip closure. When you review the many "points" of the three St. Regis Packaging Systems, you will see why each is a winner in its own field. Like heavy duty St. Regis Multiwall Paper Bags, each is designed for the efficient and economical packaging of the product or products for which it was intended. Each does its particular job – and does it well!

Because we have this complete range of filling and closing equipment, we can give you *unbiased*, authoritative advice.

VALVE PACK — *Maximum Production With Minimum Manpower.* St. Regis Automatic Packing Machines (Belt, Screw or Impeller type) preweigh your product and swiftly propel it into self-closing, valve type Multiwall Paper Bags. Gravity Type Packers are also available for filling Valve Bags.

SEWN PACK — *Efficiency Closure For Open Mouth Bags!* Quantity users of open mouth bags find the St. Regis Sewn Pack System best suited for their needs. Automatic sewing machines apply a bound-over tape and filter cord, and sew through all plies of the bag. Speedy operation and uniformly sift-proof closures recommend this system.

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CONSULT ST. REGIS – Through his technical training and practical experience in *your* industry, a St. Regis Packaging engineer can quickly help you determine the System best suited to your requirements. His advice on the selection and installation of the correct and complete packaging system is part of St. Regis' Specialized Service.

St. Regis Bags have 3 to 6 independent walls of tough kraft paper fabricated in tube form, one within the other, so each bears its share of the load. Chemical, physical properties of product determine number and weight of kraft and special sheets.

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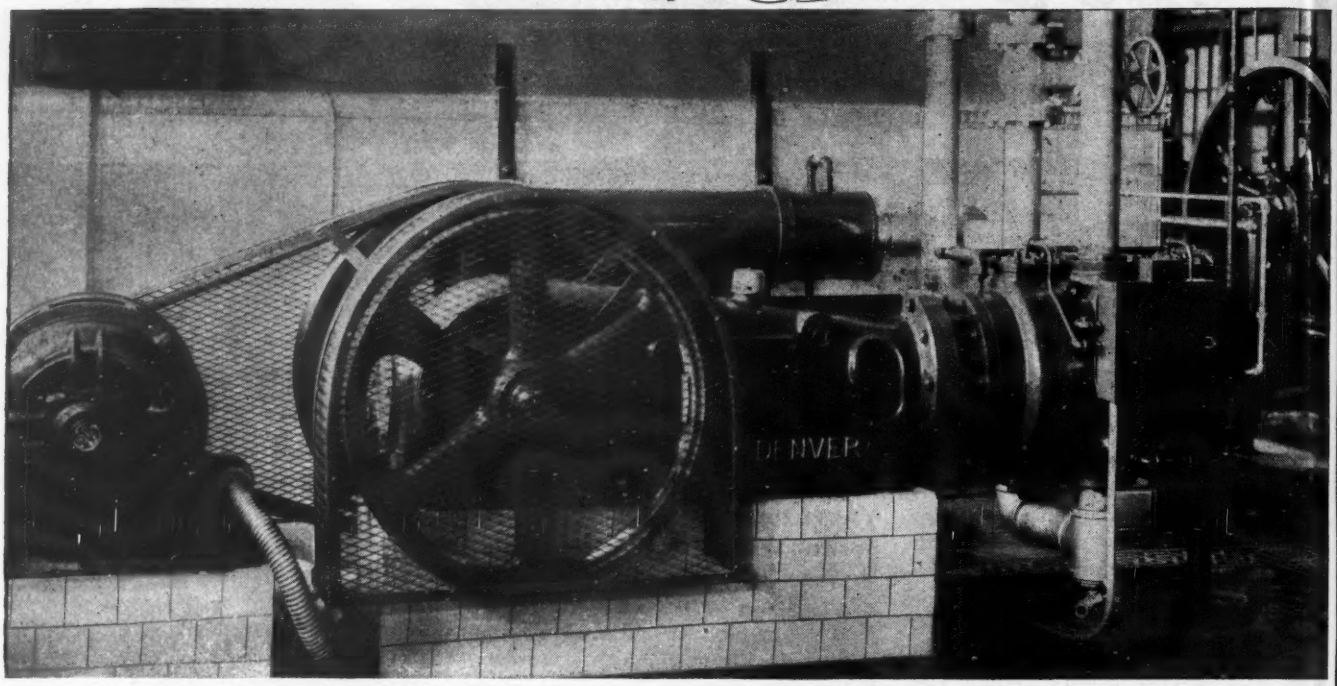
...not a drop? ...not a drop!



You won't find a drop of oil in the compressed air you use . . . when that air is supplied by a Gardner-Denver "CRX" Carbon Ring Compressor. Food flavors are protected—wholesomeness is safeguarded—by the special features which assure pure, oil-free air.

NO OIL ENTERS THE CYLINDER OF A GARDNER-DENVER CARBON RING COMPRESSOR . . .

★ No oil, water or glycerin is required for cylinder lubrication—since only carbon rings bear on cylinder walls.

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★ No oily piston rod enters the cylinder; for a special distance, piece between cylinder and frame prevents that section of piston rod working in the power end from entering the cylinder.

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In addition to such assurance of oil-free air, many plant operators prefer the Gardner-Denver "CRX" Carbon Ring Compressor for its low operating costs. The "CRX" uses the same power end that has made the Gardner-Denver "RX" compressor famous for its low maintenance and minimum horsepower requirements. For further information, write Gardner-Denver Company, Quincy, Illinois.

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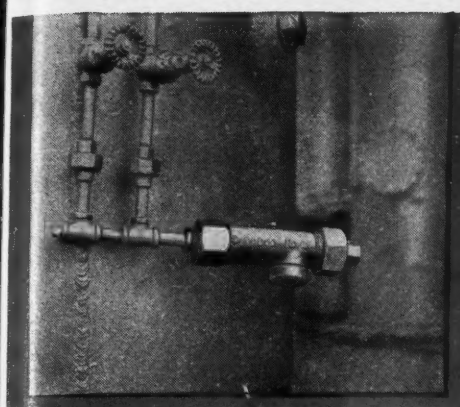

OUTDOOR TANK

PLATING

The Steam Trap with a Brain

CONTROLS TEMPERATURE WHILE REMOVING CONDENSATE

Here's one for your book! A steam trap that opens only when the tank or kettle is at the temperature which you select. Only a company making *both* steam traps and control could have thought of it. You can see that it has the elongated Sarco bellows like a temperature regulator, but otherwise is as simple and inexpensive as a steam trap.

That's why thousands of these special trap controls are used for process steam heated equipment and tanks heated by steam coils. Because it cannot freeze, it is also used for long steam lines outdoors, and even for radiators, coils, and heater lines in the refinery, coal, and other outdoor industries.

Several forms of this trap are available. Please tell us exactly what you want to accomplish. Hook-ups are shown in Catalogs Nos. 250 and 550.

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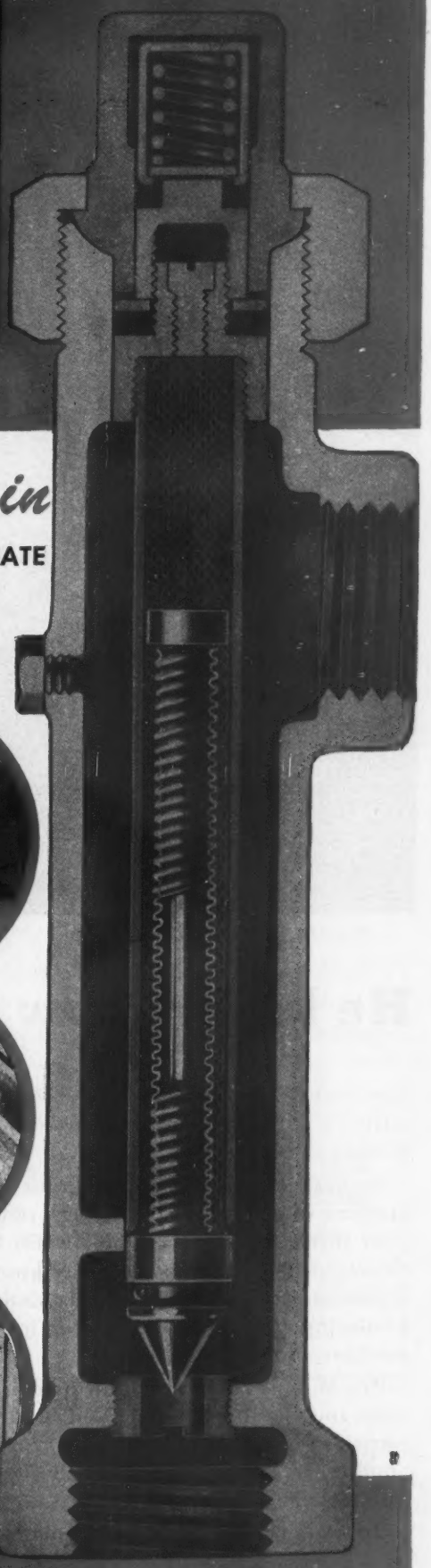
CHEMICAL

OUTDOOR



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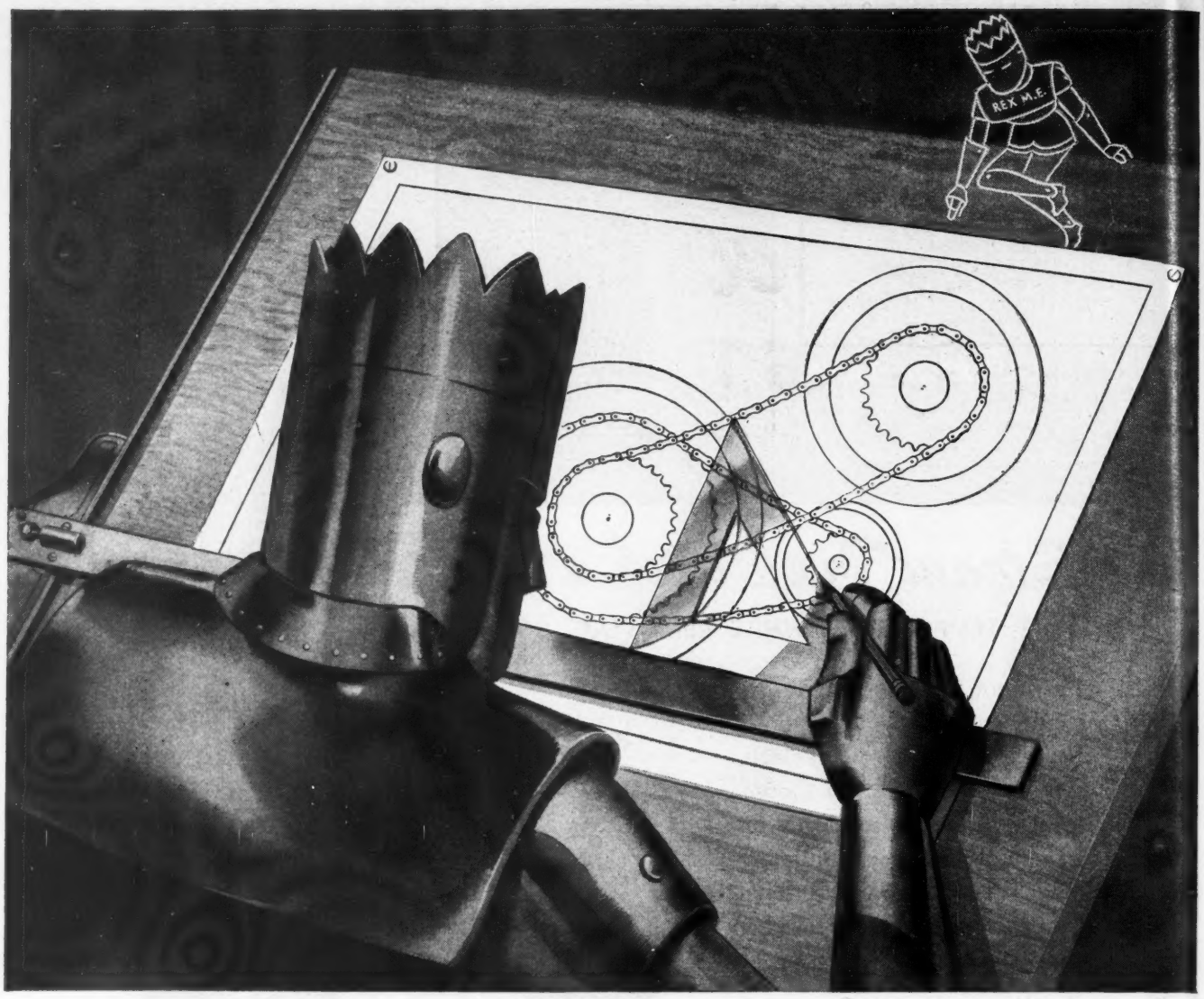


He knows how HIS belts should be applied

Rex Mechanical Engineering—Rex M. E.—must necessarily be concerned with the *application* of his chain belts as well as with their design and manufacture.

He has known for many years that in designing a machine where the angular velocity ratio must be constant that *his* type of belt—the chain belt—will give closest to 100% efficiency. He also knows that proper application of this chain belt is vital, not only for producing this efficiency, but for long life of both machine and belt.

Rex M. E. is constantly studying the great variety of cases and conditions always confronting machine designers as they transmit power from one shaft to another. To help them he has designed more than 2000 types and sizes of chain belts.

To further assist machine designers to achieve maximum results at minimum cost and waste, he maintains a field organization which is well qualified to counsel and advise them. And back of his regional men is a skilled staff in Milwaukee who has the advantages of national experience.

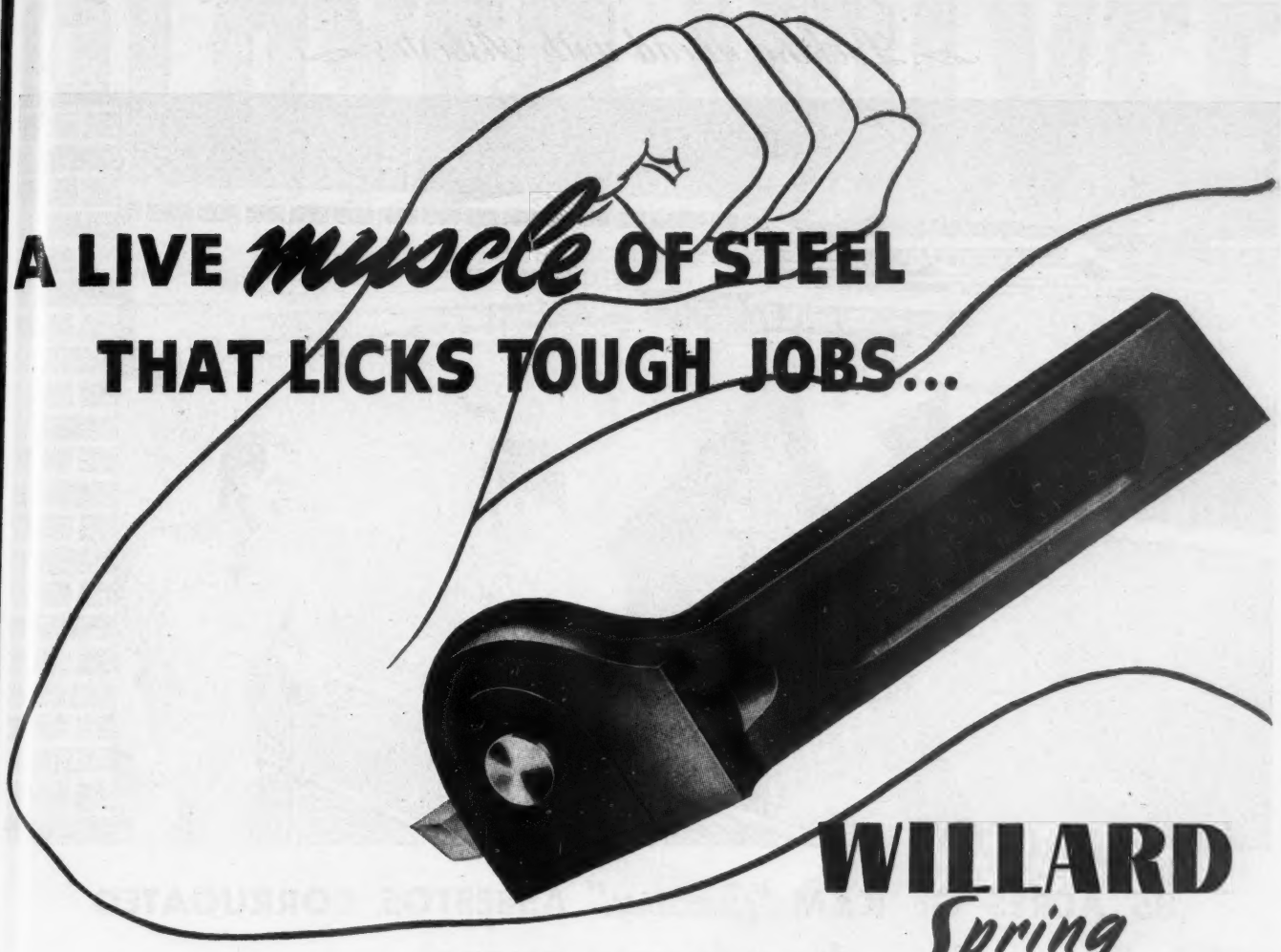
Many of his 2000 types and sizes of chain belts and sprockets are described in his 768-page catalog. A letter addressed to Chain Belt Company, 1616 West Bruce Street, Milwaukee, Wis., will bring it to you.

REX **CHAIN BELTS**

In more than 2000 sizes and types for transmitting power, timing operations, and handling materials

CHAIN BELT COMPANY ***OF MILWAUKEE***

A LIVE *muscle* OF STEEL THAT LICKS TOUGH JOBS...



WILLARD *Spring* TOOL HOLDER

For Threading and Forming

Right hand offset. Made in 3 sizes for 1/4", 5/16" and 3/8" square bits. Furnished with hardened wrench and one high speed cutter.

Resilient strength, not rigid inflexibility, is the secret of Willard Spring Tool Holders. It's the reason why these Holders are so successful in preventing cutter breakage and damaged work . . . why they can be used for fine or coarse threading without danger of chatter or tool marks . . . why they can handle faster feeds with a heavier cut . . . why they are so adaptable to a wide variety of work . . . and especially why you should specify Willard Spring Tool Holders for economy, efficiency and accuracy!

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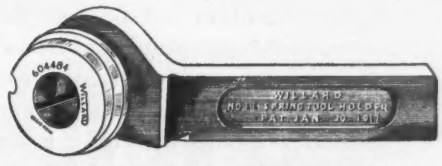

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Awarded to Auto-Ordnance Corporation for excellence in production of "Tommy" Guns

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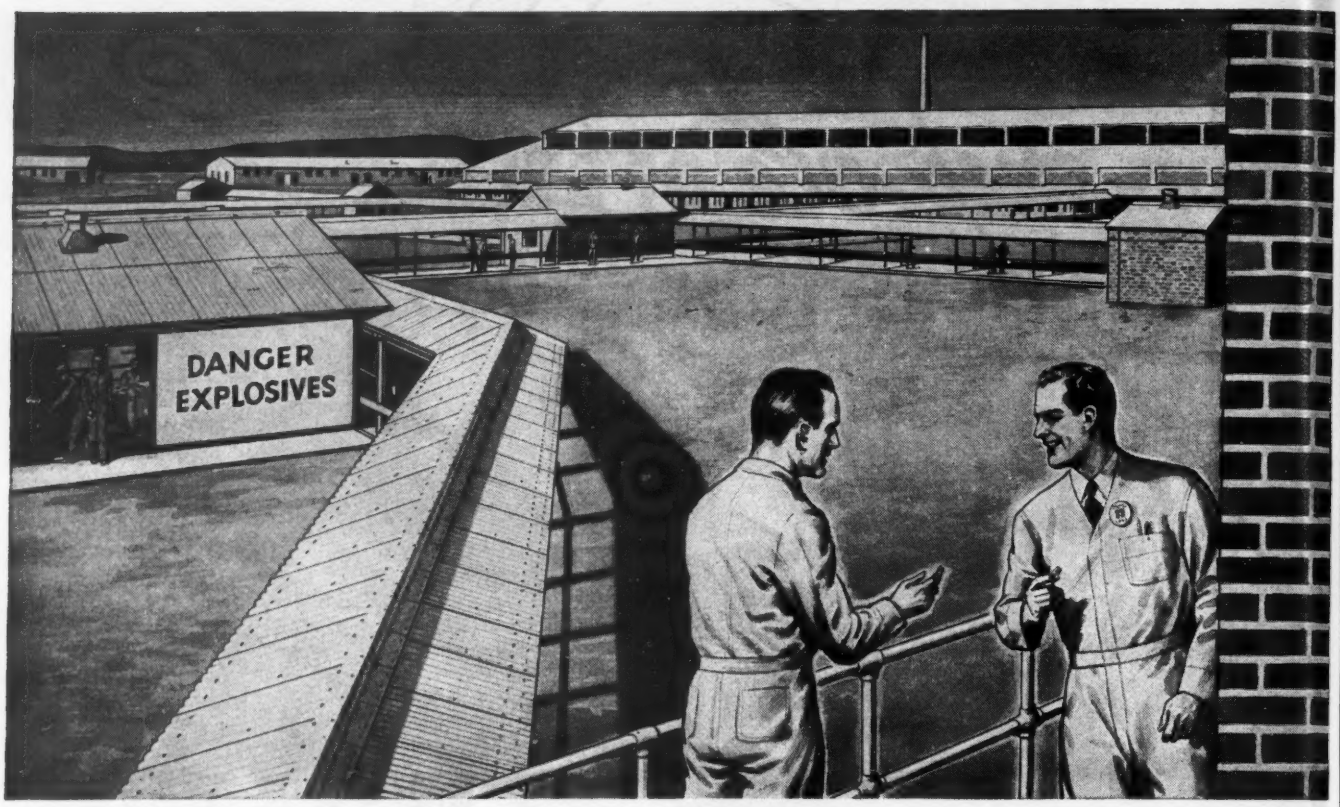
Looking ahead with Asbestos



85 ACRES OF K&M *"Century"* ASBESTOS CORRUGATED for a famous arsenal

It was an immense, urgently needed wartime project. Speed was paramount. The roofing and siding had to go on with no loss in erection time, and it had to provide permanent protection and uninterrupted service for this vital war production plant.

K&M "Century" Asbestos Corrugated met every qualification and approximately 4,000,000 square feet went into place on time . . . enough material to cover an area of 85 acres. This tremendous quantity is only a fraction of the many millions of square feet of "Century" flat and corrugated asbestos sheets that have been used for wartime construction to date.

K&M "Century" Asbestos Corrugated is produced by applying tremendous hydraulic pressure to a combination of asbestos fibre and Portland cement. The result is a truly maintenance-free sheet . . . a material highly resistant to fire and weather.

Previously, all our output of K&M Asbestos Corrugated was reserved for essential war needs. But having met many of these urgent obligations, we can now supply this remarkably adaptable, time-and-money-saving material for general use.

Wartime research at K&M continues to uncover new processes and products, and we are looking forward confidently to the rewards of these achievements in the "V" years to come.

* * *

Nature made asbestos;
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K&M best in asbestos

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ALOYCO has not relaxed its high standards of quality under pressure of greatly increased demand from war industries.

To those who use Stainless Steel Valves, the name "Aloyco" means Reliability. Experience has proven to them that once Aloyco Valves are installed, they are there to stay.

The exceptional durability of Aloyco Valves and Fittings is the result of sound design, correct analysis, experienced foundry practice, careful heat treatment, accurate machining and rigid inspection. Add them all up and they mean trouble-free service in the pipe lines of the process industries.

Send us your inquiries.

ARMY E NAVY

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VALVES and FITTINGS

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LEVER THROTTLE GATE VALVES
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GAUGE GLASS FITTINGS

Alloy Steel Products Company, Inc., 1300 West Elizabeth Avenue, Linden, N. J.

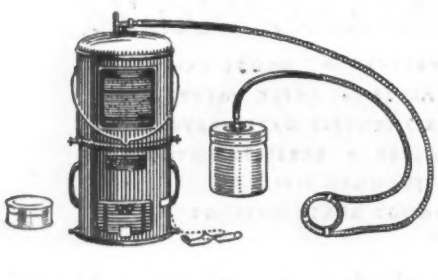
With one life to lose *he died a thousand deaths*

He was adrift on a rubber life raft.

His fight for life was a desperate one. The blistering sun was against him, and the wind, and the sea. And—toughest obstacle of all—he *had no drinking water!*

He had only one life to lose. But because of thirst, he died a thousand deaths.

You will be glad to know that our boys in the war no longer have to face this



dreaded ordeal. The life rafts and boats today are fitted with many life-saving devices recently developed by American ingenuity. Among these devices is a portable still which *converts salt water into fresh water.*

This portable still is a small compact unit weighing only four pounds for a three-man raft and eight pounds for a seven-man raft.

The heart of these stills is their fuel. It is vital that this compound be kept dry and ready for use at all times. To do just that, a Canco metal container—water, air, and dirt tight, with ready opener—is used.

Other life-saving units we make are tin containers for blood plasma . . . distress signal flare containers . . . hermetically sealed first-aid kits . . . containers for emergency field rations.

Add these containers to those items Canco makes for use against the enemy—complete torpedoes, shell containers, demolition kits, hand grenades, land mines, TNT containers, and many others—and you will understand where much of our metal is going.

Last year more food was packed in cans than ever before because of the extra needs of the Army, Navy, and the home front. This was made possible by the use of the wartime food container.

In addition, we are doing everything possible to develop suitable substitute containers for other products which have been limited by government restrictions.

AMERICAN CAN COMPANY

230 Park Avenue, New York, N. Y.

Aviation—A Progress Report

The Lessons of War Become the Key to a Richer Peace

TUNISIA, PANTELLERIA, SICILY—stepping stones to momentous events! But that is not all. For they spell out across the blue waters of the Mediterranean a pattern of invasion that has progressed far since last summer's first major Commando operation against the French coast.

From Dieppe, you remember, too many of the raiders never got back. But in Tunisia, and on through Sicily, the Allied might plowed inexorably forward, winning objective after objective at a surprisingly low cost in casualties. Air supremacy over the battlefield? Yes. But we have learned, too, how to save lives and shorten the war by strategic air bombardment as a prelude to invasion.

Thus the bombardment plane—rarely seen by the doughboys on the fighting fronts—is destined to save their lives by hundreds of thousands in the decisive attacks that are to come. This fact is confirmed by the cold calculations of the responsible strategists. It will give renewed courage and confidence to every member of the armed forces and of the home fronts throughout the United Nations.

For instance: thorough strategic bombardment of an objective reduces by nearly fifty per cent the surface forces required for invasion. Anticipated losses are reduced from more than fifty per cent of the original ground force to about twenty per cent. Precision bombardment—as used on railroad objectives in Rome—reduces this percentage of loss still further when it is followed by offensive action on the ground.

This is the fifteenth of a series of editorials appearing monthly in all McGraw-Hill publications, reaching more than one and one-half million readers. They are dedicated to the purpose of telling the part that each industry is playing in the war effort and of informing the public on the magnificent war-production accomplishments of America's industries.

The inference is clear. Effective prosecution of the war will require smaller ground combat forces and much larger air forces than some of our strategists once thought.

Our most urgent need, then, is for ever-mounting fleets of aircraft. And, fortunately, this is just what we are getting. The American aircraft industry now is producing as many airplanes as all the rest of the world combined. In 1938 we made 100 planes a month. Now we make three times that many in a single working day. By the end of 1943, our production rate will be about 10,000 a month.

But at this stage of the war, types of planes are more important than mere numbers. In the early months the program was heavy, and properly so, with single-engine trainers. Then, as training planes accumulated, the emphasis shifted to heavier types. Now we are turning out multi-engined bombers at a rate that is the envy of the entire world. Some months ago the President revealed that we were manufacturing 500 long-range bombers every month. The figure was conservative even then. And soon we shall be producing planes of this one type at a rate adequate to replace the normal losses of a fleet of at least 1000 American heavy bombers operating as continuously as the weather will permit.

A glimpse of the poundage production may help us still further to evaluate the miraculous achievements of the aviation industry as a whole. It was 89,000,000 in 1941 . . . 291,000,000 in 1942 . . . 911,000,000 in 1943 . . . and 1,417,000,000 in 1944

– if we need it. There you have the magnificent record of the American aircraft manufacturing industry – a monument to the cooperation of industry, labor, government, and to all-out teamwork between the aviation industry and those other industries which have converted their facilities to the manufacture of airplanes.

What of our enemies and our Allies?

German production probably has flattened out at 2500 a month – with downward revision in immediate prospect. Japan may be able to produce as many as 1000 planes a month – until we get our new long-range super-bombers in sufficient numbers to whittle down that figure. Italy may be able to turn out her 500 a month – for a little longer. At best the maximum Axis monthly total is 4000.

Add to our monthly score of nearly 8000, a total of approximately 4000 for Britain, Canada and Russia, and the United Nations score comes to 12,000 monthly. There we have a three to one advantage for our side. And between our own rising production and the brilliant operations of our bomber commands we should soon boost the ratio well above that figure. Therein lies the certainty of continued and growing air superiority over all the far-flung battlefields.

The critics of American airplane quality have been silenced ever since the ratio of enemy combat losses to our own on bombardment missions surpassed four to one. In the Pacific where our heavily armed and armored planes are knocking off the desperately stripped racing craft of the Nipponese, enemy losses often run as high as eight to one or more. In the Mediterranean theater, where the Italians were abandoned by their Allies, the story is much the same. Only in the well-defended homeland of the Nazis do we sometimes drop below the average, but even in those rare instances the ratio is still well in our favor and the effectiveness of our bombardment is adding constantly to our margin.

* * *

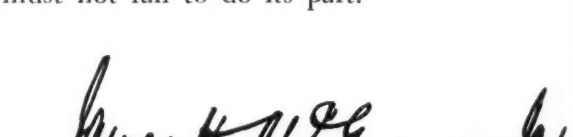
Behind the production lines the battle of research and design still rages. In many a laboratory night-shift, on many a secret test field, new and terrible surprises for the enemy are in the making. Super-bombers, destined for Tokyo, have long since passed out of the design stage and the Japanese may learn about them almost any day. New discoveries, designed to sow swift and silent devastation, are farther along than our enemies believe. No longer will fog or storm or night be permitted to fight on the side of our foes.

The men of science who are toiling to broaden the horizon of our knowledge stand today on the threshold of discoveries that have been sought for centuries. New reservoirs of power may soon exert a profound influence in many fields of technology and through them on our way of life.

Once the war is won these new discoveries will be translated into better living. No longer will countless thousands spend their lives within their own communities or countries. New efficiencies in transportation will bring world travel within the reach of many who once had to stay at home. New family vehicles will navigate the skyways as easily and safely as the highways. Already more than a dozen manufacturers of airplanes, ships, automobiles, and electrical equipment are designing, building, or flying rotary-winged aircraft such as the helicopter or autogyro to meet the needs of tomorrow's families. New and safer aircraft of the fixed-wing type are ready for production as soon as materials become available.

The quality that now makes each of our war planes worth so many of those built by our enemies will be translated into the sturdy reliability demanded by peacetime operation. The devices that seek out and find our enemies behind the veil of fog or darkness will, after the war, reduce weather hazards to the point where they will be no greater in the air than on the ground.

Science and industry will continue to do their jobs and do them well. But if the world is to be made a better place for men to live in, statesmanship must not fail to do its part.



President, McGraw-Hill Publishing Company, Inc.

FOOD INDUSTRIES

FOR THOSE WHO CONTROL QUALITY THROUGH MANAGEMENT AND PRODUCTION

LAURENCE V. BURTON, Editor SEPTEMBER, 1943

Postwar Planning—II

FROM the moment that Mussolini was kicked out it has been apparent to every responsible individual in the food processing industry that the end of the war would be a factor ultimately to be reckoned with in his future operations. This is quite a contrast to the division of opinion last April, when more than half of the executives were opposed to any current planning for meeting the problems of peace. And more than half of these believed that some time in the future when the shooting stops would be ample time to consider the problems of the postwar period.

I must confess that a year ago I shared the latter viewpoint. But, with continued study of what the war has meant to food processing and what would be likely to occur when hostilities should cease, I have been gradually converted to the idea that postwar planning for food processors has a place in today's thinking.

In the minds of many top executives—who, of course, must initiate any formal corporate action on planning for peace—there is quite a large amount of speculation on the international political outlook after the fighting stops and likewise a tendency to regard a knowledge of the terms of the peace and the character of future international trade as indispensable requirements for good postwar planning. This tendency to need all the possible information is almost an oversight of events closer at hand.

People Will Continue To Eat

Of one thing we all may be sure. People are going to continue to eat food, or soon there won't be any people and, of course, no food industry. Whether or not every last German and Jap is killed, there is going to be a daily demand for food, most of which will be processed food. Whether or not there is a just peace treaty and whether or not the treaty will make a third world war inevitable, there will be at least 130,000,000 people in the United States, plus a huge military establishment overseas to feed. And this is a big market in any language.

Whether there be inflation or controlled prices, this huge body of people must be fed. In exploring this phase of the future, I am not unmindful of the superimposed problem of feeding the starved populations of the captive nations, but I shall omit them here. For I want to focus attention on the more homely and simple problems which are facing most of the food processors.

Anyone who wants to be ready must have plans to be ready. A month before these words were written it was apparent that certain of the imported food materials were arriving in such quantities that their rationing would end soon. And in two more weeks coffee rationing ceased. Cocoa, sugar and vanilla likewise are to be more plentiful within a reasonable time. Will manufacturers be ready to recapture their old markets when the day of normal supply shall come?

Many Questions To Be Settled

Many processors have had to abandon old lines of food and convert their plants to operate on war contracts or Lend-Lease contracts. Particularly is this true of specialty food manufacturers, some of whom have even yanked out former equipment, replacing it with machinery adapted to war needs. When the time comes to resume operations on a quasi-peacetime or full-peacetime basis there are a host of problems to be considered. Can new and more efficient equipment be purchased or shall the old be used? If it is to be new equipment what will it cost and will the price be far above the old price? How long will it take to get deliveries—assuming that the shooting war is over? Will new equipment cost more than the probable market will justify? Which of several discontinued lines should be resumed first? Are there any potential new competitors also waiting to pounce on the market just as soon as they can get started, and should one try to forestall them by beating them to the punch? Which former lines should be permanently abandoned?

Those are some of the questions that must be settled by careful forward planning, which for the time is called by the popular slogan, "postwar planning." Any such plans must, of course, be flexible, and be revised from time to time as conditions change until they can be put to work. And such forward planning need not in any way interfere with the growing volume of processed foods that will be needed for some time to come to help win the war.

L. V. Burton EDITOR

The Talk of the Industry

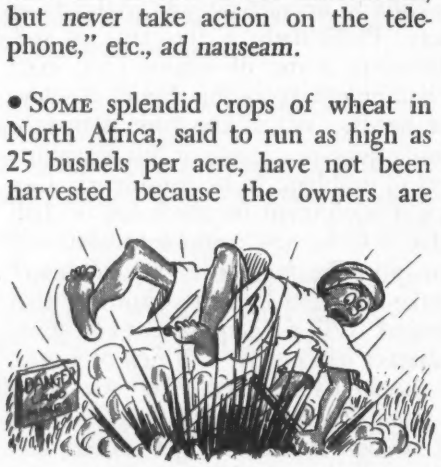
• A SEASONED business man of mature years was, by some strange trick of Fate, given a job in OPA for a few weeks about six months ago. A long-distance phone call came in during his first days on the job starting the rationing of a food item. Where could the manufacturer get enough of the item to stock his trade so that ration coupons would be valid?

The business man in OPA answered that So-and-So Company, located at X, had an oversupply on which he could draw, that OPA authorization to share with him would be forthcoming as fast as a telephone call could be completed. As far as ordinary business was concerned the job was practically finished.

But . . . a youthful lawyer was standing by his desk and admonished him thusly:

"That is not the proper way to handle a phone call. Never commit yourself to anything. Assure the caller that you will give the matter your earnest consideration, that you will take the matter under advisement, but *never* take action on the telephone," etc., *ad nauseam*.

• SOME splendid crops of wheat in North Africa, said to run as high as 25 bushels per acre, have not been harvested because the owners are



afraid to enter their own property. The difficulty is that German troops planted mines liberally in these fields when the grain was just emerging from the soil. Up to now the fields have not been deloused.

• RED tape reached a new high when an official of WFA sent to the Lend-Lease Administration a letter bearing the signature of the Food Administrator who then was Claude Wickard. The proper official of L-LA telephoned to the WFA subofficial saying,

"Sorry, old man. L-LA does not recognize the WFA. You'll have to write the same letter on USDA stationery to be signed by the Secretary of Agriculture, not by the W.F. Administrator."

• WITH the end of coffee rationing, retail sales of coffee took a flop. According to one incident, there was even an effort to reverse the normal flow of sales. A woman came to a chain store with ten prewar vacuum cans of a well-known brand of coffee and tried to get credit for them. No dice!

This slowdown of sales when food rationing stops is an important merchandising factor to be reckoned in forward plans.

• UNUSUAL conversations often arise in crowded taxicabs in Washington where the rule is to fill every seat in an effort to compensate for the acute shortage of taxis. One morning a somewhat loquacious stranger in the front seat regaled the other riders with a caustic monologue on Advisory Committees.

"I am going to one of these so-called Advisory Committee meetings this morning. Do they want my advice? Naw! All they want the committee for is to tell us what they have done—never to ask us what would be the best thing to do under the circumstances. . . . And generally the action decided upon and already in effect is about the worst that could be done. I'm sick and tired of being on an advisory committee. . . ." He spat the words out contemptuously.

"Why not tell them about it?" cautiously inquired one of the riders.

"What good would that do? All that would happen would be that I'd get fired off the committee."

"Are you afraid of getting fired?"

"Naw."

"Well, why not raise enough hell so that you will compel them to take the committee into their confidence?"

"'N get fired off the committee—what good will that do?"

"Maybe you could scare them so bad that they wouldn't dare fire you off. . . . By the way—are you any good at raising hell?"

"Lissen, Buddy, I was a machine gunner in the last war. I came up in business the hard way. This morning I just got a wire from the War Department that my kid—an aviator—is missing in action in the Solomons. I've just had me a pint of whiskey. Can I raise hell???"

Just then the taxi stopped at the west end of the South Building of the Department of Agriculture where one enters the War Food Administration offices. The stranger got out and the taxi went on with the other passengers.

• INCIDENTAL Intelligence: Alfred McCann, Jr., broadcasts that there are 21,000,000 victory gardens from which he hopes there will be packed from

10 to 20 million jars of vegetables. According to our arithmetic this would be one jar per victory garden.

• To meet shortage of hard rock miners—which is the cause of insufficient production of copper, zinc and molybdenum—the Army has transferred some 4,500 such miners to the Enlisted Reserve. Each man must register with U. S. Employment Service, which will assign him to jobs where the greatest amount of production of metal per man hour will be possible. It will be noted that the miner is not sent where the help shortage is most acute but where the greatest production per man can be obtained.

If the miner refuses the civil job he is put back in uniform and resumes his military career. This is a vast improvement over an effort about a year ago to increase the number of miners by granting them a six-month furlough to go back to their old jobs. WPB says that about half of them never went near the mines at all.

The incident is important to food processors because it shows that when skilled help is needed badly enough the men can be recalled from domestic Army camps. Men who have gone overseas are not returnable for this

purpose—yet, nor are men who have already completed their military training and are in units scheduled to go overseas.

Do You Want Our Annual Index?

With paper rationing increasingly severe, FOOD INDUSTRIES must conserve still more paper. To accomplish this we propose to stop binding the Annual Index into the December number.

Those who bind their annual volumes will, of course, need the Annual Index, but to get it you will have to write to this office and order it before November 15, 1943.

We figure we can save 104,000 pages of paper by omitting the Index. Those who want it will be provided one free copy if they order before printing time.

Production Decline— Our National Mystery

The deplorable decline of urgently needed production of war materials has become a much advertised national mystery. It's everybody's problem. And it requires everybody's cooperation and hard work to solve it. Although few food manufacturers are actually engaged in production of fighting equipment, this war is everybody's war. Hence it is important that everyone understand the problem and lend his personal influence and aid to its solution.

First, consider the problem itself. Those who have gained knowledge of it from newspaper headlines are likely to have an incomplete understanding. Need for fighting equipment is constantly increasing despite continual shifts from one type to another. The schedule of our military production is still going up; 1943 production has been scheduled to be larger than 1942; and 1944 production is already scheduled to be bigger than 1943. Bigger in each succeeding year, yet usually different. Thus, with the campaigns in North Africa victoriously completed, we have little need for production of more desert fighting equipment.

Next, look at the production record. According to authentic information, the U. S. munitions industry produced only 42 percent of the 1943 schedule in the first half-year. To meet the second half-year schedule, because of the constantly increasing demands, we need to produce not 58 percent of the year's schedule but more nearly 75 percent. We have $39,000,000,000 now invested in new war plants! But the needed production is not coming as fast as it should.

With the shooting war just starting, there is a national hazard in such delayed production. What is wrong? Is it overoptimism and complacency on the part of workers at home, as many have claimed? This may be a part of the trouble, but other students of the problem believe it is more deep-seated than that. One tank arsenal's schedule was cut back to 500 tanks per month but the arsenal succeeded in producing only 350—just 70 percent of the number scheduled.

Various coal strikes, for which John L. Lewis must take his full share of responsibility, cost between 250,000 and 300,000 tons of steel that was scheduled but not produced. To this must be added another 100,000 tons lost due to subsequent captive-mine strikes and the difficulties of getting steel mills back into production.

A certain new high-octane gas plant which was way behind schedule on construction revealed that the workers had decided they "were going to keep the social system for the boys as it was when they went away."

Some airplane plants are reported to have a comfortable "country-club" sort of atmosphere, a sort of hangover from the days when they had a surplus of workers. Manpower shortages in some airplane plants have forced some changes from three eight-hour shifts to two ten-hour shifts with a consequent loss of about 15 to 20 percent of production.

All the foregoing observations are from official sources. But from unofficial sources there comes a still different sort of story to the effect that workers are dead tired, need rest and recreation after many months of seven-day weeks with two to six hours of daily overtime. Many war plants are located far from good housing facilities and in places where the only recreation is the nearby tavern. Some workers, it is said, have not had a Sunday off in nearly a year. Some workers, apparently much less than 40 years of age, are said to be tottering

Hors d'Oeuvres

• *Inspired by an F. I. item on home dehydraters, a reader writes: "Is there any way to dehydrate homes in Akron?" He might try going to sleep with a lighted cigarette in his hand.*

• OPA's Amendment 5 to MPR 319 reads: "1. Section 1351.1918 (a) (7) is amended to read as follows: (7) All commodities listed in Appendix A are those known to the trade as such excepting therefrom such thereof, if any, while subject to another regulation."—Yes, of course.

• *A St. Louis company reports the greatest public demand for malt sirup since repeal of Prohibition in 1933. Home brew is coming back. We'd hoped those days were gone forever—those days of the home brewed hangover.*

• Rum is so plentiful in Martinique that the natives have been using it as a substitute for gasoline. Would be nice to go there with a B card.

• *The President's latest address to the nation has been called a political speech. Perhaps the fourth-term slogan will be "Two cups of coffee at every meal."*

• Vanilla, chocolate and strawberry are the favorite ice cream flavors, accounting for 75 percent of all the ice cream manufactured. Make mine vanilla, and no remarks about modern improvements.

• *Says Chairman Davis of NWLB, the national economic stabilization policy has been "remarkably successful" with the single exception of the cost of food. That is, you can still live within your income if you don't eat.*

• Rationing of fats to the housewife has caused a sharp decline in home baking. So commercial bakers could increase their sales considerably except that they are so short on shortening that they may have to shorten their markets.

• *With the production of the supplies and implements of war at high levels in this country, there is danger of a "let-down" psychology developing in industry. But if we let down now, our honorable enemies may add the "and out."*

• It has been suggested that the helpful information bulletins issued by Dairy Industries Supply Association (DISA) be called "DISA DATA."

• *More than 13 to 1 of the women of America believe that point rationing is successful in maintaining a fairer and more even distribution of food, a poll by a woman's magazine reveals. Of all things, OPA has friends.*

• Mineral oil can be used to control the corn earworm. Castor oil ought to be effective, too. F.K.L.

with fatigue as they return home.

What ever is the cause of the decline, whether it be complacency, foolish political views, misunderstandings of the urgency of our national need or a lack of sufficient food, rest and recreation, the situation is serious from the military viewpoint. It may be the cause of postponing the one battle that might stop the enemy forever, or postponing the huge bombing raid that would wipe out final opposition.

Production schedules of weapons, as well as foods, must be maintained. It's everybody's job.

Grade Labeling Revived

Regulation No. 1 by the Office of Economic Stabilization was explained by the following words quoted verbatim in part from an August 5 handout, OWI—2288.

"The Taft amendment to the Emergency Price Control Act of 1942 deprived OPA of its power to require grade marking of meats. This amendment was passed as a part of the Commodity Credit Corporation Appropriations Act of 1943. By its terms and as explained on the floor of the Senate the amendment was only a limitation on the power of OPA. Unaffected was the power earlier granted by Congress in the act of October 2, 1942, authorizing the issuance of regulations by the President to accomplish the stabilization of prices affecting the cost of living. By Executive Orders that authority and responsibility for its exercise has been delegated to the Director of Economic Stabilization."

Nothing that we could say regarding this blatant controvention of the intent of Congress could add to your own pungent comment on the matter.

Cereal Processing To Increase

Direct-consumption foods or crops is a term few of us recall having heard much about prior to this war. It refers to those foods which are consumed directly without an intermediate stage which is that of converting the crop to animals or fish and then eating them. Conversion of seven pounds of corn into one pound of pork involves a loss of about 84 percent of the energy value of the corn. If human beings ate the corn directly, the entire energy would be saved or utilized for human life. Conversion of cereal crops into other meats involves slightly greater losses.

The job of sharing our food with our Allies and the captive nations which will be progressively freed will require that civilians in the U. S. consume more direct-consumption crops. Professor W. I. Myers of Cornell University calculates that the energy foods for a population three and one-half times our own can be provided by U. S. farms if all the vegetable foods go directly to human beings.

This potentiality, it is planned, is to become more and more of a reality. Translated into ordinary language, the people of the United States are going to be forced to eat less animal proteins and more foods produced from vegetables and grains.

Cereal processing is due for an increased demand just as soon as the pinch comes. Smart food manufacturers, like General Foods, are aware of the future trend and are bending their energies toward readiness for the increased burden—or opportunity. Our own estimate of the situation is that the pinch will come as soon as hog and livestock numbers are materially reduced, especially hogs. Probably by the spring of 1944 the demand for cereal products will be apparent to everybody. And housewives will be sorely taxed to provide variety for the family dinner table.

Your time in which to prepare for the job is only about six months. The duration of the heyday period of direct-consumption foods has been variously estimated to be from two to five years before the unusual demands for food from North America will be satisfied.

It is not to be expected that dairy animals will be reduced in numbers, nor that all our meats will be cut off. But it is a reasonable anticipation that civilians will get considerably less meat than at present.

"Food Fights for Freedom"

Under the slogan "Food Fights for Freedom," the War Advertising Council is preparing to stage a big advertising campaign to prepare the people for their part in the fight for freedom on the food front. This move is a part of the activities of the War Food Administration, the WAC donating its services, and will come not one moment too soon. Need for the cooperation of food manufacturers was suggested in these pages in the August issue of FOOD INDUSTRIES.

It is at last apparent, from a preview of the plans of WAC, that official Washington is beginning to be genuinely aware of the stupendous food needs of the future and begins to understand the moves that must be made to attempt to cope with the problems. You will read more about the campaign in future months.

All food processors are urged to cooperate, not only in educating their consumer customers but also all their own millions of employees, who can be far more effective in food conservation than twenty times as many persons outside the industry.

How To Use Enemy Patents

Enemy-owned U. S. patents seized by the Alien Property Custodian are available to citizens on a nonexclusive-license basis at $15 per patent without any royalty fees. Information concerning these patents is obtained by writing to the office of the Alien Property Custodian, Field Building, Chicago, Ill. About 40,000 patents and pending applications are involved and, of these, there are a few hundred of primary interest to food processors.

A Fundamental Issue

Without entering into the controversy over skim milk *vs.* defatted milk, we should like to point out that Wright Patman's bill H.R. 149 "to increase agricultural purchasing power and to meet the need of combating malnutrition among people of low income by defining and making certain a reasonable definition and standard for nonfat dry milk solid" is raising a basic issue regarding the ultimate authority of the Food and Drug Administration.

The question is whether an industry can work through Congress to overrule the administration of a law previously enacted. It took nearly four years of legislative effort to produce the present Food, Drug and Cosmetic Act. H.R. 149 would create the questionable precedent of legislative overruling of the procedure previously established by law.

This publication has no attitude toward the legal name of what is left after the fat is taken out of cow's milk. We do, however, question the advisability of a lateral attack on the food law however benign the motive.

Yield Tests Show Six Ways To Save Materials

By JAMES G. BROWN, Chemical Engineer, Terre Haute, Ind.

How one manufacturer analyzes operations to find leaks of raw materials. Worthwhile savings are effected and the utmost production is obtained from the materials purchased. The author tells how to make yield tests and what they show.

EVERY food manufacturer faces today a situation hardly dreamed of a few years ago—serious shortages of raw materials. Not only are imported materials such as spices, gums and flavors difficult to procure, but domestic materials like eggs and edible oils have been in such tremendous demand that in many cases they are available only on strict quotas. Under these conditions, the highest attainable efficiency in converting raw materials into finished products is vital. Losses of scarce and valuable materials in manufacturing operations must be reduced to bedrock.

At the same time other factors are working against efficiency—high labor turnover (especially near booming war industries), pressure to make shipments and the difficulty of securing new and more efficient equipment. Occasionally all of these factors may be at work simultaneously in a single plant, resulting in increased handling losses, more spoilage through processing errors and a generally lowered percentage of output from the available raw materials.

How one progressive plant has met the problem of getting more product out of less material under increasingly unfavorable conditions is presented here.

The plant under discussion is a thoroughly modern six-story, reinforced-concrete structure of about 300,000 sq. ft. of floor space. Its products include salad dressings, prepared mustards, preserves, jams, jellies, extracts, peanut butter, macaroni, spaghetti, noodles and fruit-flavored gelatin-dessert powders. Both wet and dry processes are utilized.

Employees number about 1,000. The plant is in a defense area. In labor turnover and percentage of new help, it may be considered fairly representative of current conditions in the food industry.

General Plan of Attack—The Yield Study

When material shortages began to pinch, the management quickly sensed the implications of the situation and the urgent need for getting the maximum product out of every pound of material purchased. Chemical and cost departments were asked to evolve a plan for the detailed study of operations in a single department for the sole purpose of detecting and reducing material losses. To conform with existing accounting terminology, this study was named a "yield study."

It seemed desirable to capitalize upon the objective viewpoint of the technical personnel and their familiarity with operating problems; and also to carry out the study with a minimum of interference with normal production. Thus the job appeared to be one for the laboratory rather than for either the cost department or the foreman, and a member of the laboratory staff was assigned to it, full time.

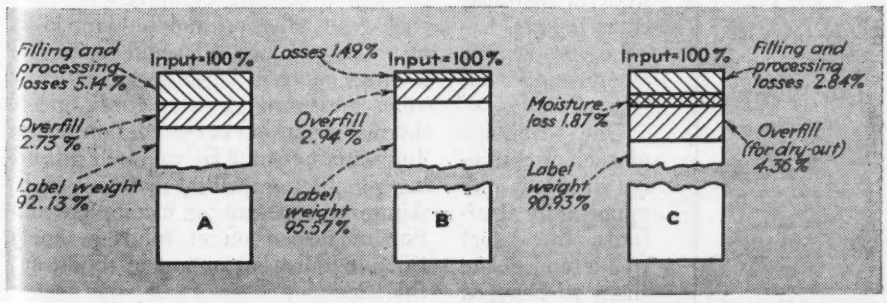
Technical training is not absolutely essential for making a yield study, for complicated chemical, physical and mathematical relationships are not normally encountered. Nevertheless, a labratory man who is familiar with processing details and formulas usually will be more successful in analyzing operations than an office man without this practical background. He is also likely to be more thorough and impartial than the busy foreman.

The plan originally called for the study of only one department. Later, as this first study progressed and its value in reducing material losses was proved, the studies were extended to other departments. Still later, it was discovered that minor changes in operations, such as formula revisions or equipment alterations, might introduce new conditions which would require restudy of a department. As long as shortages of food materials continue, there probably will be opportunities to profit from continued yield studies, although it should not be necesary to maintain them on a full-time basis.

Investigation of records and test production runs inevitably interfered somewhat with normal operations in a department under study. Nevertheless, in all cases the individual conducting the yield study was given free rein to make all observations deemed necessary. An executive who is considering yield studies for his own plant will want to make certain that enthusiastic cooperation prevails between laboratory, cost department, and production department—especially at the outset, before results become apparent. Without it, the study will be likely to fail.

Examples of Savings Effected By Yield Studies

A study of preserve and jelly manufacture led to a net saving of several hundred dollars weekly by reducing overfill. This was accomplished in part by more frequent checking of jar net-weights, and in part by installing a sim-



Bar charts show the proportion of losses to the total. A—Wet process. B—Dry process. C—Combination of wet and dry process.

ple heat-transfer device to permit filling jelly at a temperature at which jar overflow is minimized. This same study uncovered sugar waste in rejected material and pointed the way to salvage operations. It also showed the inefficiency of daily short runs of numerous flavors, because of wash-down losses. The latter are now replaced by full day runs of single flavors, saving both time and material.

A study of salad dressing preparation disclosed a waste of several hundred dollars worth of valuable materials monthly in washing down equipment and showed how to reduce this loss without extra equipment. This was done by scraping down the sides and bottom of the tanks with a rubber squeegee on a long stick—a somewhat awkward job because of the built-in agitators, but it paid well.

A study of macaroni manufacture revealed the discarding of unrecorded scrap, which was causing excessive "unaccounted for" material losses. Experiments were recommended to develop a use for this scrap so that it would not be a total loss. This study also showed a large loss from damaged bags of raw material, which has been reduced by improved handling methods. At this writing, the monetary value of these savings has not yet been definitely established, but it is estimated at over $100 monthly.

The yield-study method of reducing materials losses will pay substantial dividends, as materials often make up to 90 percent of the total costs.

Method of Making a Yield Study

Essentially, a yield study is a systematic collection of all pertinent data, followed by the preparation of a complete report with detailed recommendations for saving material. The following procedure has been found satisfactory.

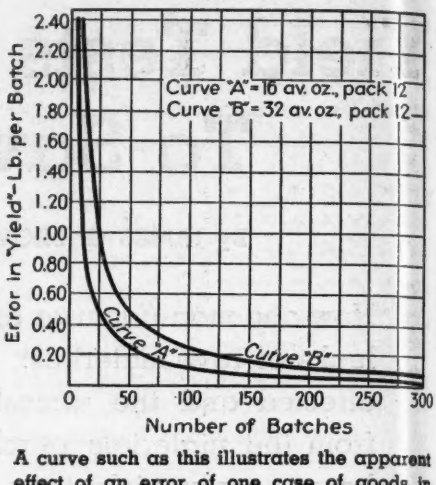
1. Selecting the investigator: The laboratory is a good source of investigators for yield studies, although technical training is not essential. An impartial observer is the real need. The attitude of seeking only "true" facts is all-important. Any attempt to cover up or show up someone's supposed errors or inefficiency makes the study unreliable. It might better be abandoned than carried through to false conclusions.

Familiarity with processing operations is desirable but can be absent if replaced by good powers of observation and attention to detail. A healthy skepticism, or "from Missouri" attitude, is a real asset in getting at facts and separating them from opinions and wishful thinking.

2. Studying plant records: Extensive observations and experiments can often be avoided if the investigator begins his study by familiarizing himself with existing plant records pertaining to material usage. Frequently, cost records will give the first indication that abnormal waste is occurring in a process, and will provide the starting point for an entire yield study. Sometimes also the records will show some apparent loss that will reveal inaccurate original sources of information.

The investigator should begin by learning exactly what records are kept on material usage, where the original figures are obtained, what kind of reports are prepared and what conclusions may be drawn from the available figures. This may require study of material-usage reports, finished-production reports and inventory methods.

One advantage of such preliminary study is the opportunity it affords to detect trends and relate them to changed operating conditions. For example, a sudden decrease in material used in some dry process might be traced to the installation of a dust collector and suggest a similar saving elsewhere. Another advantage is learning how to prepare test data to conform with existing records and forms—a convenience in interpreting experimental results. A third is the possibility of making recommendations at the end of the study which will increase the accuracy and usefulness of plant records.



A curve such as this illustrates the apparent effect of an error of one case of goods in the count of production. This graphic analysis was a potent argument for mechanical counters to eliminate human errors.

3. Studying operations to locate losses: After studying the office records covering material usage for the process in question, the investigator is ready to go into the plant and there observe the physical handling of the materials. The operations involved will vary widely with the type of plant and product, and few concrete suggestions can be given. The main objective will be to locate all sources of material loss, however trifling.

Even apparently tiny losses mount up surprisingly when the volume of production is great.

In wet-manufacturing processes, some of the things to observe are leaks in tanks, pipe joints, valves; evaporation or entrainment of vapors; spillage over the tops of containers (from storage tanks through processing equipment to final packages); adhesion and hold-up losses in tanks, mixers, kettles and piping; inaccurate meters, depth gages, scales or other measuring devices; errors due to thermal expansion or contraction (where fluids are measured by volume); discarding of inferior-quality material as by skimming or decanting; incomplete solution or suspension of solids in fluids; variable moisture content of solids; and the like.

In dry-manufacturing processes there will be spillage, screening loss, leakage

YIELD STUDY

Date: _____

Name of Product: _____ Fill: _____ Pack: _____

INPUT

A. Number of Batches: _____

B. Formula Used: _____

C. Raw Material Data: _____

OUTPUT

Time Start Fill: _____ Time Stop: _____

ITEM	Quantity	Weights Gross	Tare	Net	Unit Wgt. Lbs./Unit	Total Wgt. Of No. Used
A. Glass & shippers						
B. Caps						
C. Labels						
D. Glue (Labels)						
Glue (Shippers)						
E. Total						
F Product, as packed & Weighed						
G. Grand Total						

H. Finished Product (G. minus E.)

_____ _____ _____ _____ _____ (Solids) (Moisture)

Yield Analysis Item	Actual computed from above test date	Standards	Cost Dept. Figures
I. Lbs. out per Batch			
J. Case Cases			
K. Case Cases per Batch			
L. Total No. of Jars, Pkgs.			
M. Avg. Wgt. per Jar, Pkg.			

Analysis By _____

Blank data form used in yield tests.

of free-flowing materials, variable moisture content, discarding of inferior material, dusting and degradation loss.

The foregoing lists, by no means exhaustive, indicate the type of detail a yield study should cover. Observing and noting all processing losses is a task of the greatest importance, and may well require an observation period of a number of days to insure against omissions. In general, the more a given quantity of material is handled the higher will be the material losses. Therefore, the investigator questions continually the necessity of each operation involving a loss, with a view toward simplifying the process whenever practicable. Thus, the observed loses in a yield study may eventually fall into two classes—necessary (unavoidable) and unnecessary (avoidable).

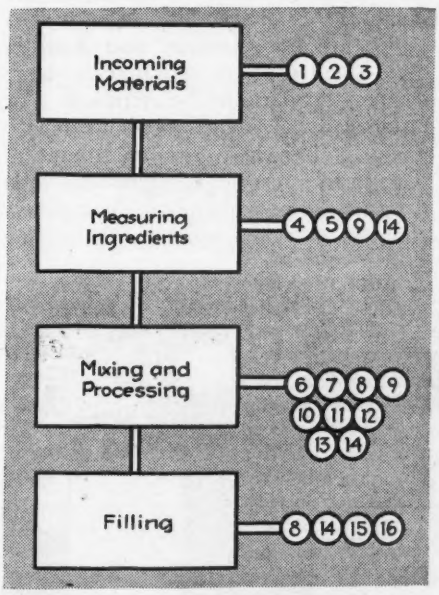
4. **Measuring losses:** When the location of losses has been determined, the job is only half done. The next step, of equal importance, is to determine their amount. In so doing, limits must be set on the detail of breakdown. For instance, several small losses, like leaks, may often be combined without sacrificing accuracy. The most significant measurements, of course, will be the largest "avoidable" losses. They will indicate the savings that might be effected and, consequently, the investment justifiable to eliminate them. At present, with new equipment and extra labor almost out of the question, the possible changes will usually be fairly simple ones, based upon salvaged or noncritical materials so that possible investments will be small anyway.

How to measure losses will vary with the type of process and kind of loss. In the case of batch operations, the measurement of losses is relatively simple. Very accurate preparation of a batch (or preferably several batches) permits determining the exact weight entering the process. The product from this batch, or batches, is kept separate from regular production long enough to be weighed accurately, and the difference between input and output is the overall loss. Whether it will be possible to break down this loss further depends upon the individual case. Sometimes it may be possible to weigh the test material at several points in the process and so obtain the successive losses. Again, losses due to moisture changes may be evaluated by analysis, before and after, and by the usual calculations. Frequently, spillage or leakage is of such physical character that it can be gathered up and weighed. In all cases, the important thing is to express yields and losses on a weight basis, and to account for as much of the material as practical before lumping remaining loses in an "unaccounted for" accounting catch-all classification.

In continuous processes, the problem of evaluating loses may be more complex. The input for a known time-interval must be determined as accurately as possible on a weight basis. It may or may not be possible to weigh all the lost material; if not, the final product for the test interval must somehow be segregated and weighed to establish the overall loss by difference. This may require interruption of the process at the beginning and end of the test, in which case consideration must be given to possible extraordinary losses caused by the interruption itself.

The degree of accuracy of all measurements is significant in a yield study. For example, it is better to weigh all the finished product by truck-loads on a high-capacity scale having an error of, say, 10 lb. in 2,000 lb., than to weigh 1 percent of the packages on a small scale with an error of ¼ oz. in 16 oz. and then multiply the average package net weight by the number of packages produced.

It is also better, when the nature of the container permits, to weigh all the containers to be filled before a test, rather than to use an average tare weight. Glass jars, for example, often will vary considerably in weight; if the average tare weight is not representative of the actual filled jars weighed, the test results may be considerably in error. On the other hand, when the containers are formed by the filling machine itself, they cannot be weighed conveniently before filling.



1. Leaking containers.
2. Short weights.
3. Variable moistures.
4. Temp. - volume effects.
5. Inaccurate meters, scales, etc.
6. Leaky pipes and fittings.
7. Leaky tanks and equipment.
8. Overflow.
9. Spillage in transfer.
10. Evaporation, dry-out.
11. Dusting, degradation.
12. Skimming, decanting, discarding unwanted fractions.
13. Screen tailings.
14. Adhesion losses.
15. Overfill.
16. Breakage, spoilage.

A graphic description of an operation showing where the losses actually occurred. The key to the circled numbers is given above.

Routine control methods often include package net-weight checks. If the total product is weighed with an accuracy equalling or surpassing that of the check weighing, the correlation between actual observed weight and that computed from the number and average weight of the packages is an interesting check on the accuracy of the sampling technic.

A test run of 10, or even 100, batches is more reliable than a single test batch. But one must be governed by the time and effort required to make a quantitative test run, and must pick the test conditions striking the best balance between accuracy and practicality.

A quantitative test requiring many measurements should be made twice if real accuracy is desired. The first test is a "dress rehearsal" in which the experimental errors of omission and commission may be detected. Some are bound to occur, especially if part of the data must be taken by individuals not familiar with the object and technics of yield studies (as may happen in the case of simultaneous determinations requiring an assistant's help). It is just as well to recognize this fact and allow for it at the outset.

5. **Recommendations for reducing losses:** The investigator working along the foregoing lines almost always finishes with ideas on ways to reduce losses of raw materials used in the process studied. Some may prove impracticable but most, being based upon careful observation and detailed knowledge of operations, will be workable.

Many studies involve so much detail that the main purpose may be lost in a mass of figures. This main purpose, it must never be forgotten, is to develop practical recommendations for saving materials. The success of the whole study is measured by this one standard —the savings it makes possible.

It will be necessary, after evaluating losses on a weight basis, to have the cost department convert the data to dollars and cents. Then the amount of potential saving from any recommendation can be weighed against the cost of carrying it out. Does it appear, for example, that a cover on a kettle will reduce splashing or evaporation losses? Then the question to be answered is "Will the necessary investment pay?" Or does it seem that some present waste might be salvaged by cleaning or reprocessing? Again, "Will it pay?"

(Turn to page 132)

Small-Tube Heat Exchangers Offer Many Advantages

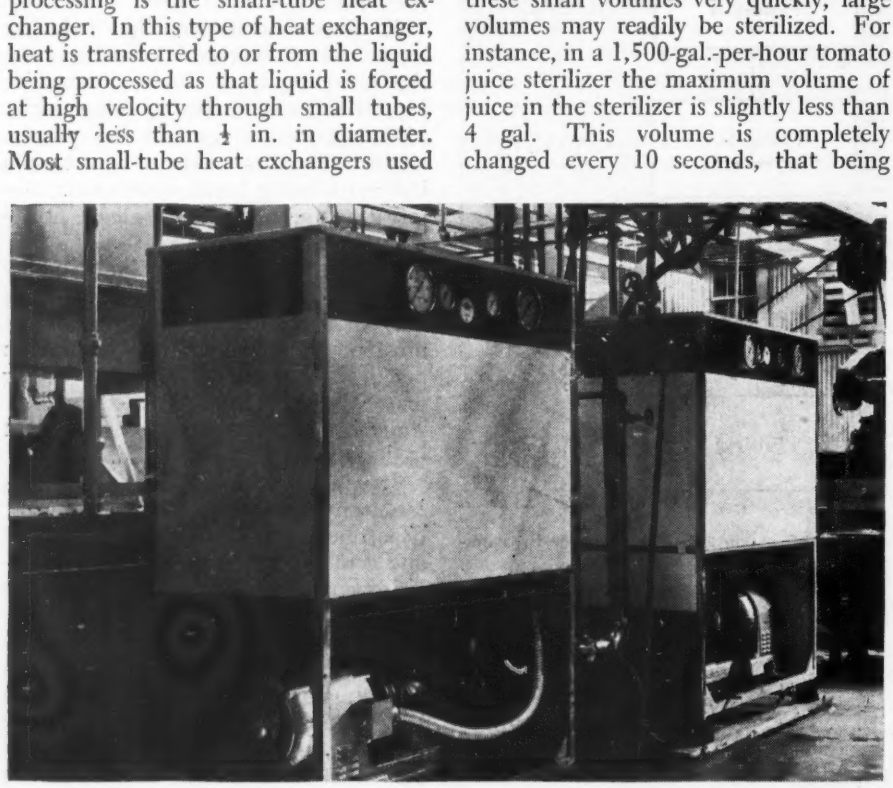
By JOSEPH W. COURTIS, Vice-President, W. E. Mallory & Co., Ann Arbor, Mich.

The design of these exchangers makes them high-speed in operation, sanitary and efficient. And continuous short-time "sterilization" results in less flavor loss. Units require less metal

IT is the trend in food processing to reduce the required time by increasing the temperature. This trend is particularly true in the liquid-food field. In an endeavor to use shorter processing times, many food packing plants are adapting old equipment or are using equipment designed primarily for other products, such as the use of milk pasteurizers in the citrus industry. The results with the adapted equipment are often unsatisfactory as compared to those with equipment properly designed for the purpose.

An important development in the field of short-time high-temperature processing is the small-tube heat exchanger. In this type of heat exchanger, heat is transferred to or from the liquid being processed as that liquid is forced at high velocity through small tubes, usually less than ½ in. in diameter. Most small-tube heat exchangers used commercially have both heating and cooling portions. In the simplest case these two parts are connected by another length of tubing in which the product is held at a constant temperature for a sufficient length of time to complete the processing. For food processing the complete heat exchanger usually consists of a heating section, a processing or holding section and a cooling section integrally combined within a single piece of equipment.

Extremely small volumes of liquid are treated at any given instant in the small-tube exchanger. But because it is a continuous operation and handles these small volumes very quickly, large volumes may readily be sterilized. For instance, in a 1,500-gal.-per-hour tomato juice sterilizer the maximum volume of juice in the sterilizer is slightly less than 4 gal. This volume is completely changed every 10 seconds, that being the total time required to heat the juice, process it at 285 deg. F., and cool the product to packaging temperature.



A dual installation of small-tube heat exchangers in a citrus plant. These units may be run separately or simultaneously. One has a capacity of 350 gal. per hour and the other 450 gal. per hour.

The term "heat exchanger" is more general than "pasteurizer" or "sterilizer." By changing the processing temperatures, the same heat exchanger can be a pasteurizer today and a sterilizer tomorrow. Pasteurization is intended to kill all organisms found in the product that are harmful to man, thereby making the product safe for human consumption. Pasteurization normally protects the consumer but does not necessarily protect the product itself from the action of bacteria contained in the raw food. We all know that pasteurized milk, though processed to be safe for human consumption, sours and changes in character after pasteurization, because certain organisms found in the raw product survived the pasteurizing treatment required to kill pathogenic bacteria. Sterilization is a more severe process than pasteurization. It not only protects the consumer, but the product as well, by killing all organisms present.

Most commercial processes producing so-called "sterilized" food are not true sterilizing processes. Instead of killing all organisms found in the product, they kill only those organisms capable of growing in the specific product under conditions normally found inside the closed package. The presence of organisms which will not grow or multiply in the closed container will not markedly affect the keeping properties of the product, though all pathogenic or disease producing organisms must be destroyed. Commercially sterile rather than completely sterile products are prepared because of the adverse effect on flavor of most true sterilizing processes.

Part of the confusion regarding pasteurization and sterilization comes from the use of milk heaters or tubular pasteurizers in the fruit juice industry. The juice is often said to be pasteurized, although the canned product must be at least commercially sterile to keep satisfactorily.

Pasteurization is most commonly applied to a nonacid product (milk). Acid products do not support the

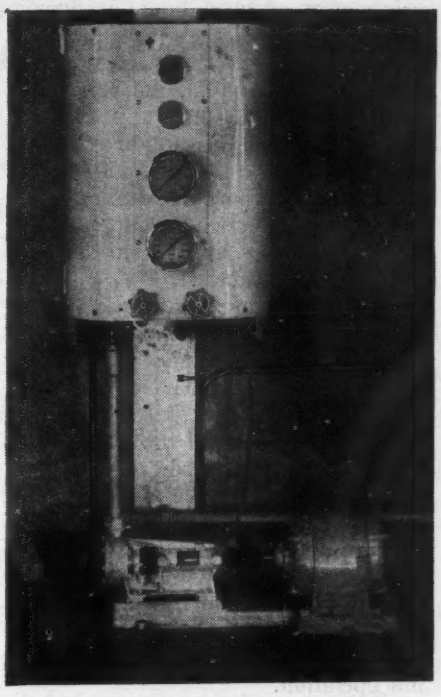
growth of as many types of bacteria as do the nonacid products, and many of the heat-resisting organisms are among those which cannot grow in an acid product. Most juices are definitely acid in character. Time and temperature conditions which are required to *pasteurize* a nonacid product approach in severity the conditions required to *commercially sterilize* an acid product. Flash pasteurization methods applied to milk have proved that a satisfactory pasteurization effect equivalent to 30-minute holding at 143 deg. F. can be achieved with 15-second holding if the temperature is increased to 160 deg. F. Citrus packers generally use temperatures higher than 160 deg. In flash pasteurization, milk is cooled immediately at the end of the 15-second hold and bottled cold, whereas in the citrus plant the can is filled with hot juice and then cooled. The 2- to 5-minute period required for the hot juice to flow through the filler and into the can, and for the can to move to the cooler, is from 8 to 20 times the holding period used in flash pasteurization of milk, and during this time the temperature of the juice is still high enough to destroy bacteria. The juice may be pasteurized as it leaves the tubular heat exchanger, but it becomes a commercially sterilized product in the time between leaving the exchanger and the cooling of the can.

Whatever other advantages are offered by a proposed process, the food manufacturer is interested only if it will have at least the same lethal effect as the one already being used successfully. The question is, will a process at higher temperature, having the same killing effect on the bacteria in the product, impart more or less flavor change and vitamin destruction?

While the rules governing the killing of bacteria and those governing cooking are not exact, they are good first approximations such as are commonly used in making engineering predictions, and a generalization of them into simple relationships is possible and is of interest.

Lethal Rate

The work of numerous investigators, notibly Bigelow[1] and Ball,[2] established that not only are bacteria killed more quickly at higher temperatures but there is a general relationship which can be expressed mathematically between the temperature increase and the reduction in time required to produce sterility. If for simplicity we ignore any periods of heating the product to, or cooling from, the processing temperatures, and minor individual differences between strains of organisms, and so forth, the general formulas reveal that for the same lethal effect only one-tenth the time is required if the temperature is increased about 18 deg. F. This has wide application and yields a good guess on the thermal death characteristics of most organisms in a considerable temperature range above the lowest temperature that will kill the organism in question. In calculations, the processing times and temperatures must be the minimum conditions in the food, and not retort conditions.



Wall-model small-tube heat exchanger designed for apple-juice processing. This unit has a capacity of 300 gal. per hour. The tubing ending immediately below the unit should be connected to the filler.

With a reduction in time to about one-tenth of its original value for a temperature increase of 18 deg. F., further increases permit additional reductions. If the processing temperature is increased 54 deg. F. (3x18), the time required becomes one-thousandth of the former value (1/10x1/10x1/10). High temperatures kill bacteria in extremely short times.

Cooking Rate

Cooking (flavor change, vitamin destruction by heat, burning, and so forth), is, in general, a thermo-chemical reaction, and chemical reactions respond differently to temperature increases than do the biological processes of living cells. The rate of chemical change is doubled or tripled for each 18-deg. F. increase in the temperature of the reacting chemicals. Assuming that cooking is governed by this rule in the range of temperatures used to process liquid foods, the effect of increased processing temperatures on the cooking of the product may be calculated.

Taking a three-fold increase in cooking rate for an 18-deg. F. temperature increase, an increase of 54 deg. F. (3x18), will give 27 times the cooking effect (3x3x3), provided the time remains the same. If the time is reduced, the net result will be found by multiplying the rate by the time during which it acts. In our illustration, if the time is reduced to one-third when the temperature is increased 54 deg. F., the net increase in cooking will be 27x1/3, or nine times the original.

But with an increase of 18 deg. F., the same sterilizing effect is obtained in one-tenth of the time, and for a 54-deg. F. increase, only one-thousandth of the time is required. Applying these figures to the cooking rate, with an 18 deg. F. temperature increase the cooking rate will be three times the original, the safe sterilizing time one-tenth, and the net cooking effect three-tenths. If the temperature increase is 54 deg. F., the rate of cooking would increase 27 times, the safe sterilizing time is one-thousandth of the former time, and the net cooking effect 27/1,000, or about 1/37, of the original.

A safe sterilizing process at elevated temperature increases the rate of chemical change or cooking, but the processing time required is reduced so drastically that less change of the product occurs. A fresh-tasting product with maximum vitamin retention is of prime importance for many canned foods. These products will be benefited by short-time high-temperature processing.

In most commercial applications of the small-tube heat exchangers, an increase in the processing temperature of at least 50 deg. F. has been possible, and in some cases the recommended process is at temperatures more than 100 deg. F. above the standard process, so that the 54 deg. F. increase may be taken as typical.

The temperatures referred to are the minimum temperatures actually attained in any portion of the liquid during the original process. If these precautions are employed, an increased factor of safety for heat resistant organisms will result in the high-temperature process. Many pathogenic bacteria are more easily killed than the general figures indicate.

So far in this discussion, the effects of cooking have all been considered as entirely undesirable. Obviously, for some products there are also beneficial cooking results. These may be obtained with high-temperature short-time processes, just as they may be obtained in a retort process, and the advantages lie in

shorter time required for proper cooking and in savings due to increased plant efficiencies.

Process Control

To obtain the benefits of the short-time high-temperature processing, the product must be heated to, and cooled from, the processing temperature as rapidly as possible. Unless heating and cooling times are a small fraction of the processing time, the periods of heating and cooling must be taken into consideration in determining proper processing conditions. Control of the length of the processing time must be accurately maintained.

Because the processing times are only seconds long, control might appear to be difficult. However, in a continuous-flow heat exchanger, control is automatic and requires almost no supervision from the operator at the processing plant. In the simplest case, a positive displacement-pump forces the liquid food through the exchanger. The output of the pump will be constant at a given speed, and that volume, flowing through a tube of uniform size, will move at a constant velocity. The designer provides for proper heating, processing, and cooling by assigning to each section a length of tubing determined by the velocity of the liquid moving through it and the time desired. A small fraction of a second may be represented by several feet of tubing, making split-second timing easy. The operator need only watch the speed of the pump, by observing a tachometer or equivalent device, to determine that proper processing times are being maintained.

Control problems assume their greatest importance when the sterilizing value of the process is just sufficient to insure commercial sterility. Since the chemical effect of short-time high-temperature processing is so much reduced, sterilizing processes having two or five times the required lethal effect may safely be employed without endangering the quality of the final product. Thus, although the design of the equipment lends itself to accurate control, the results of this type of process make control relatively unimportant.

Heat-transfer Characteristics

A great deal of research lies behind design formulas used to produce good small-tube heat exchangers. The very short times used require extremely good heat-transfer characteristics. The high processing temperatures demand that the equipment be so designed that the product does not burn on the heating surfaces.

It is generally accepted that to every surface over which a liquid is flowing some adheres, and that the liquid near the surface moves at a slower speed. This volume of liquid, the velocity of which is greatly reduced, is called a laminar film. Slower motion results in longer exposure of the liquid in the film to the heat, and in some cases the film stays hot long enough to cook and form a solid layer adhering to the heating or cooling surface.

In ordinary equipment, solid film, or "burn-on," must be removed at intervals because it interferes with proper heating and cooling. And in food processing, if burn-on is dissolved or mixed with the main body of the liquid being processed, it may impart a cooked or other off-flavor to the final product. Flavor change may occur for this reason in some products which, though changed in flavor by heating, do not form a solid film on the surface. The control of filming is an extremely important aspect of heat-exchanger design and operation.

It has been known for a long time that the thickness of the film on a surface could be reduced by increasing the velocity of the liquid over the surface.[3, 4] In small tubes, velocities can be obtained which will prevent burn-on or filming, and it is this principle which is used as the basis of design in the small-tube heat exchanger.[5] The method is expensive, requiring high-pressure pumps and large motors. It can be justified only for certain products such as liquid foods. The exact conditions required are dependent not only on the processing conditions and tube size, but also on the product being processed. Some concept of what is required can be had from the fact that although a ½-hp. motor is ample to pump tomato juice to a 1,500-gal.-per-hour sterilizer, it requires a 20-hp. motor to pump the same juice through the sterilizer.

A greater retention of natural flavor is not the only gain obtained by the extreme stirring in small-tube heat exchangers. The resistance to flow of heat through slowly moving or stationary liquid is quite large. Elimination or marked reduction of the low-velocity laminar film on the heating or cooling surfaces permits much greater heat transfer from the metal surfaces to the product. Properly designed small-tube heat exchanges, therefore, have a very much better heat transfer than the usual heating equipment. The extremely rapid heating and cooling needed to produce the full benefits of short-time high-temperature processing are thus obtainable in small-tube heat exchangers.

Short processing times and film reduction remove the fear of burning the liquids and permit simplification of heating methods. There can be a greater temperature difference between the heating surface and the liquid to be heated. Steam may be applied with perfect safety to the outside of the heating portion of the processing tube.

Material Requirement

Because of the small volume of liquid inside the unit at any time, the amount of critical material required is extremely low. In a 1,500-gal.-per-hour sterilizer having a total weight of 2,500 lb., less than 325 lb. need be of stainless steel or other similar material. Calculated on the basis of three basket retorts, with juice packed in No. 2 cans, eight retorts would be required to replace one 1,500-gal.-per-hour tomato juice sterilizer. The retorts and baskets required would weigh 11 tons more than the weight of the small-tube sterilizer.

The ease in handling juice which has been sterilized in bulk and cooled while rolling the cans to the labeling and casing equipment permits a saving of from five to eight men per canning line over those required by the usual retort methods. Bulk sterilization is also considerably easier on the cans than retort methods, and as long as tin is scarce this point is well worth considering.

Suggested Uses

The development of small-tube heat exchangers is quite recent. The advantages of short-time high-temperature processing have only recently been recognized. It follows that many processes in general use today will probably be replaced as the advantages of the new methods become better understood.

There is the possibility of aseptically packing fluid products which have been sterilized and cooled before packaging, to give the ultimate in flavor retention. To date most of the commercial use of small-tube heat exchangers has been in canning plants, though in the future the greatest benefits may prove to be in the dairy field. Improved heat stability has been reported for evaporated milk flash-forewarmed in this type of equipment.[6,7]

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Why Not Standardize Food Machinery?

By JAMES C. HAAS,
Doughnut Corp. of America, Ellicott City, Md.

During the period of the war, when the manufacture of food processing machinery is restricted, efforts should be directed toward developing improved equipment for the postwar period.

ALL food machinery and equipment manufacturers must now ask themselves, "Are there any of our processes, materials, machinery and equipment that are going to emerge from the war two decades old because they remain unchanged for the duration?"

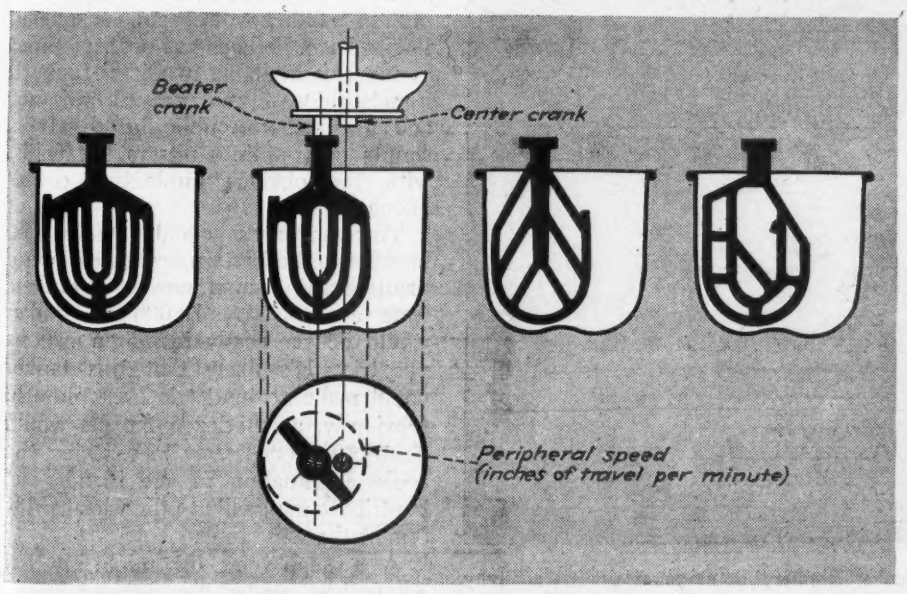
For example, mechanical cake mixers suffice for the duration. No definite modification, development or pronounced improvement in their standardization has been required by total war production. As a consequence, they will continue in use practically unchanged for the duration. Will they emerge at the end of the war outdated —a handicap to the baker in meeting postwar competition—or will research have improved them voluntarily and kept them current with this war's rapid pace of advancement?

To clarify, let us closely examine the mechanical cake mixers in use for the war's duration and for a decade prior to Pearl Harbor. They have many variable features:

Each mechanical mixer manufacturer's product has a different speed range, even though the terminology may be the same—low, medium or high, with a fourth speed in some instances. Normally, the first three speeds are termed, first, second and third—yet, in no instance that the writer knows about is the first or low speed of one manufacturer's mixer the same as that of another's. The same applies to all other speeds when comparisons are made among these mixers. To prove this point, the beater speeds (in revolutions per minute) of the mechanical cake mixers of five leading manufacturers are listed for comparison in Table I.

Table I—Comparison of Beater Speeds.

Speeds	Mixer A	Mixer B	Mixer C	Mixer D	Mixer E
First	86 r.p.m.	81 r.p.m.	108 r.p.m.	292 r.p.m.	89 r.p.m.
Second	157 r.p.m.	142 r.p.m.	177 r.p.m.	167 r.p.m.	160 r.p.m
Third	265 r.p.m.	270 r.p.m.	275 r.p.m.	123 r.p.m.	236 r.p.m.
Fourth	———	480 r.p.m.	———	96 r.p.m.	348 r.p.m.



A number of the mixer blades now in use in electrically driven mechanical cake mixers. Also a diagram explaining "peripheral speed."

Also, manufacturers do not give, in definite terms, the actual drag, resistance or effect on the batter in standard periods of time, as it is whipped, creamed or mixed in the bowl.

Then, too, while the beaters or blades supplied for general mixing may bear a general resemblance, one to the other, when they are examined as to the number of grids and the shape or design, much variation is found. Naturally, the number of grids and the shape of such grids are as important, and should be as definitely considered, as the number of rotations around the mixer bowl each minute and the speed of revolution of the beater. Specific consideration is given herein only to the "flat rubbing or batch beater"; and the bun or sweet dough, the diamond grid, mass pasty, or 4- to 6-winged beaters, which are specifically designed for a particular job, are not considered. However, all other comments, except the number and design of the grids, could also be applied to these special beaters.

The capacity in quarts of mechanical cake mixer bowls is quite universally uniform, *i.e.*, 20, 30, 40 and 60 quarts, and so on. However, their size, in diameter and depth, differs materially. Manufacturers of electrically driven mechanical cake mixers have relatively recently, prior to Pearl Harbor, shown an inclination to design along lines of deeper mixer bowls with consequent smaller diameter of bowl and lesser width of beaters. This has been done so that a smaller horsepower and more economical or less costly motor drive could be utilized. However, no uniformity in design, as to depth and radius or diameter of bowl, has prevailed.

Accordingly, with a universal lack of uniformity and standardization of mechanical mixer bowls, crankcase or spindle speeds, and beater turns, there should be ample evidence as to why many cake bakers who have been very successful in one shop, using one kind of mixer, experience so much difficulty when adjusting to a line of satisfactory cakes in another bakery. Applying the same perfected formula, incorporating the same kind and amount of ingredients and using the identical method and bake as was employed elsewhere often do not suffice to assure success.

It can be understood readily why it is so difficult to make the necessary interpretations and adjustments when applying standard instructions to mix any dough, especially cake, doughnuts and similar products, with such mixer-control variations and lack of standardization existing. It is also evident why so much need exists for a specialized manufacturers' production service.

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Remote Factors That Affect Food Plant Policies

By R. S. McBRIDE, Editorial Consultant, "Food Industries," Washington, D. C.

Late spring on the Great Lakes and other seemingly unimportant factors may decide which flour mills will close and where other food manufacturing can occur. Interlocking of food industries makes local difficulties of national consequence

FLOUR mills in the eastern part of the United States, including those of the great milling center of Buffalo, may not operate in a normal fashion later this year. A shortage of wheat in that area may curtail milling production and compel capacity operation of western mills. All this is a possible, almost probable, consequence of the late spring on the Great Lakes.

Because the ice went out much later than normal, movement of ore eastward from Duluth could not begin until at least two weeks late. That represented a major burden on the war effort just at a time when every ton of ore which could be moved to eastern lake ports was going to be needed for capacity operation of the steel industry engaged on war projects. Naturally, the authorities have had to do something to offset the delay. They have found it necessary to interrupt wheat movement eastward so that every available ship could be put on the more necessary job of ore transport.

Affects Production of Alcohol

All this comes at a most unfortunate time for the wheat farmers and the milling industry. Uncle Sam was counting on the millers to provide granular wheat flour for alcohol manufacture from at least 150 million bushels of wheat. That would provide about 50 million bushels of wheat mill feed, equal in value to corn, and granular wheat flour enough to make about 275 million gallons of industrial alcohol. Much of the milling of wheat for this purpose should occur in the eastern states near the alcohol plants which require the granular flour. Officials are now worried as to whether the wheat will be available in such mills. If it is not, then the eastern mills may be idle and the Western mills may have to work overtime. All this because the ice went out of the lakes later than usual.

Fermenter of 40,000-gal. capacity in an alcohol distillery at stage of greatest activity. Distillers are forbidden to use corn because of its scarcity, and there is a question as to whether wheat or granular flour will be available next winter as a raw material. This is one of the uncertainties concerning the supplies of raw materials.

Alcohol Complications

Regardless of where the wheat is milled, the question is now becoming important as to whether wheat or granular flour will be used for alcohol at all. Already whiskey distilleries and industrial alcohol plants are forbidden to use corn because of the scarcity of that grain. Will there be similar scarcity of wheat next winter? If so, what will be used?

Obviously, great relief could be afforded if molasses were brought from Cuba and Puerto Rico, where it is wasted. That would restore industrial alcohol operations to normal prewar methods. The alcohol plants would be delighted. But getting the ships to bring the molasses is quite another question. There is no doubt about the availability of molasses. There is at least 50 million gallons worse than wasted in Puerto Rico. Perhaps two or three times as much is available in Cuba. In both islands the waste molasses is a nuisance and a threat to public health. It is simply run out into pits in the fields, with the obvious unpleasant consequences.

This molasses could readily be brought to the Eastern Seaboard alcohol plants if a very small number of tankers were available. A 10,000-ton tanker would deliver nearly 2 million gallons per trip. It's likely that this tanker could make a round trip every month. Obviously, a half-dozen tankers would contribute very largely to relieving the molasses situation in the islands and contribute materially to the wheat problem at the same time.

As a rough guess, one might say that six tankers, under the assumed conditions, would bring molasses equal to 60 million gallons of alcohol per year.

That would make unnecessary the use of granular wheat flour from 36 million bushels of wheat. Of course, there would be an incidental loss of some of the feed fraction of this wheat. But that loss is more apparent than real because if the wheat were milled for food instead of for alcohol there would be considerable feed production as an incident.

Molasses Byproduct

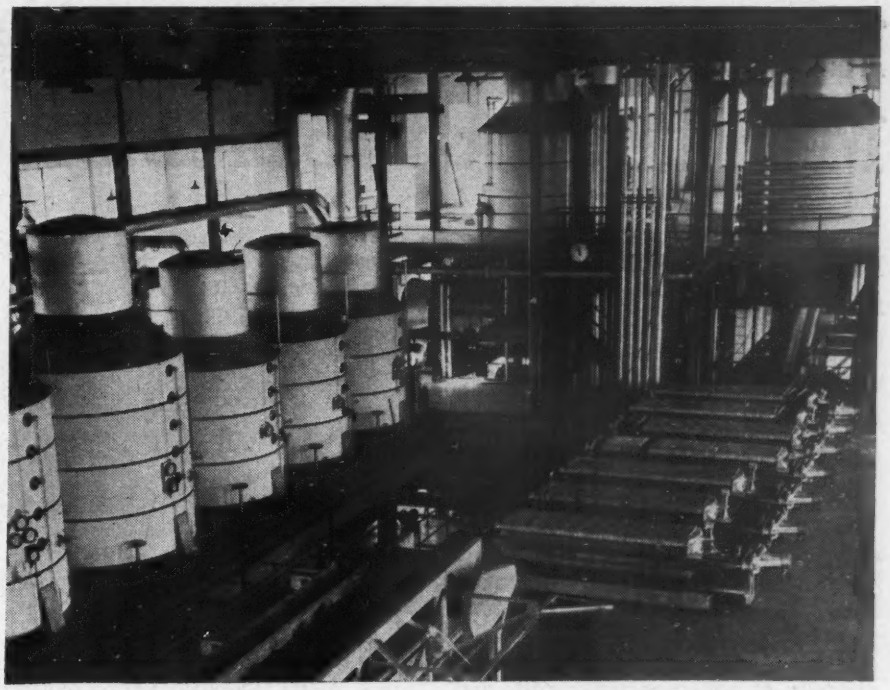
If the molasses is not brought from Cuba and Puerto Rico, and much of it is not likely to be, there is then the problem as to making something useful from the molasses down in the Islands. Such developments are having serious official consideration in Washington at this time. The urgency of this matter has greatly increased because the domestic molasses supply from the beet sugar industry has been greatly curtailed from small plantings of sugar beets this year. Thus, one finds a close interlocking of the Michigan, Ohio, Colorado and California beet business with questions affecting citric acid, lactic acid and other fermentation products which might be made in Puerto Rico.

Proposals are being seriously studied for the establishing in Puerto Rico of plants to make all of these fermentation and yeast products down there. It is a nice question of balance between one scarce material and another which must be settled by official review.

Yeast for Feed

One of the most promising projects appears to be the manufacture of high-protein high-vitamin dried yeast. These possibilities have not yet been worked out commercially in a convincing fashion. But the British have done some work of this sort at Jamaica, and official Washington is looking into the matter to appraise the possibilities for Puerto Rico, for example.

If one takes a typical gallon of cane molasses of blackstrap grade, he finds 6 lb. of fermentable sugar. When appropriate ammonium salts are added, with other yeast foods, this is an ideal fermentation raw material. Several varieties of yeast can be grown on such a medium with high efficiency. It appears that more than 3 lb. of yeast (dry weight) can be made per gallon of molasses used. In one series of laboratory experiments, one of the yeasts tried has proven to be a strong-growing vigorous product of high feeding value. It appears that about 55 percent of the dry weight is protein and that the B group of vitamins is present in high concentration. Such a yeast has very great feeding value for poultry, cattle and other domestic food animals. In effect, the yeast converts waste carbohydrate and surplus ammonium salts into urgently needed protein with high vitamin content.



The operations of beet sugar refineries, such as the one shown here, will affect the food industries in more ways than one. Monosodium glutamate, used to give a meaty flavor to foods, is made in large measure from the filtrate of the process which recovers sugar from beet molasses. But it has been proposed to divert beet molasses to fermentation use for the manufacture of yeast and food acids.

It is obviously much easier to bring the dry yeast back to the United States, since it does not require a tanker for transport. Moreover, every pound brought is a useful high-value feed stuff. Uncle Sam is wisely trying to determine whether it is commercially feasible to carry out on a large scale the conversion of some of the many millions of gallons of waste Puerto Rican molasses into this much needed product.

Glutamate Complications

Few food technologists realize the importance of monosodium glutamate. It is a product of meaty flavor which can very usefully be applied for savoring many products for which sufficient meat cannot now be spared. Among other things, it serves to make high-protein seed meals far more flavorsome and therefore much more useful as a meat substitute or as a stretcher for the meat content of mixed foods.

But sodium glutamate is made in a large measure from the filtrate of the Steffens house which recovers sugar from beet molasses. Production of that molasses is naturally much less because of the fewer tons of beets which are going to be processed this season. Furthermore, there has been a proposal to divert the beet molasses to fermentation use for manufacture of yeast and the food acids referred to above. Certainly some such raw material is going to be needed in the United States for the manufacture of fresh yeast. It is not feasible to make that yeast at remote points like Puerto Rico and supply it for household or bakery use throughout the United States. Dry yeast can be brought that way; but fresh yeast—no.

At one time some government enthusiasts thought that they would stop the operation of Steffens houses in the beet sugar plants of the country. They discovered that this caused many serious technical and economic complications. All of July this subject has been a battleground of conflicting interests seeking to work out a program that would give the greatest overall benefit to the country on the use of beet molasses. If the molasses is not processed in the Steffens house, there will be less sugar for distribution. There will be no Steffens filtrate from which to make glutamate. All the economics of sugar plant operation will be very radically changed. In fact, it appears that some beet sugar mills will have to shut down completely if they cannot process molasses.

Interlocking Industry

These random examples of complicated food technology show the interlocking nature of the food business. They are only a few of many. But they convincingly prove that a threat against one unit of the food business is a potential hazard for many others.

How Big Fleet Owners Meet Truck Problems

Borden, Sheffield and Heinz find answers to critical wartime shortages of trucks, gasoline, tires and repair parts. There are ideas here for all food truck operators

TO keep their trucks running for the duration, three leading truck operators in the food field have attempted to overcome the tremendous obstacles of rubber and gasoline shortages, the difficulty of obtaining repair parts and the scarcity of trained mechanical shop help.

Assuming that what some of the large truck owners have done, other food companies can also do, the wartime procedure followed by these three truck operators in maintaining their vehicles should help large and small truck users in the food industry to solve their problems. The Farm Products Division of The Borden Co., the Sheffield Farms Co., Inc., both in the New York metropolitan area, and the H. J. Heinz Co., Pittsburgh, Pa., which has plants throughout the United States, are the companies to which we refer.

As far back as June, 1942, these companies, by directive of the ODT, eliminated all call-backs and special deliveries to reduce truck mileage. Borden and Sheffield Farms, however, were unable to lower the general frequency of home deliveries because of the "status quo" order issued by the War Labor Board which followed an attempt to introduce an every-other-day home delivery.

Horse-drawn Wagons Used

Immediate steps were then taken to increase the number of horse-drawn wagon routes. Sheffield Farms replaced over 70 motor trucks and changed from rubber tires to steel on more than 250 wagons. Borden was able to increase its wagon routes by only 7 percent—from 217 to 232. Any greater increase was prevented by the company's inability to enlarge its stable facilities and to procure additional wagons. It abandoned some territory, eliminated a few low-pointage routes by consolidation with other adjacent routes, and in several areas changed over to daylight hours of delivery. Up to the present time, it has done no testing of wooden tires.

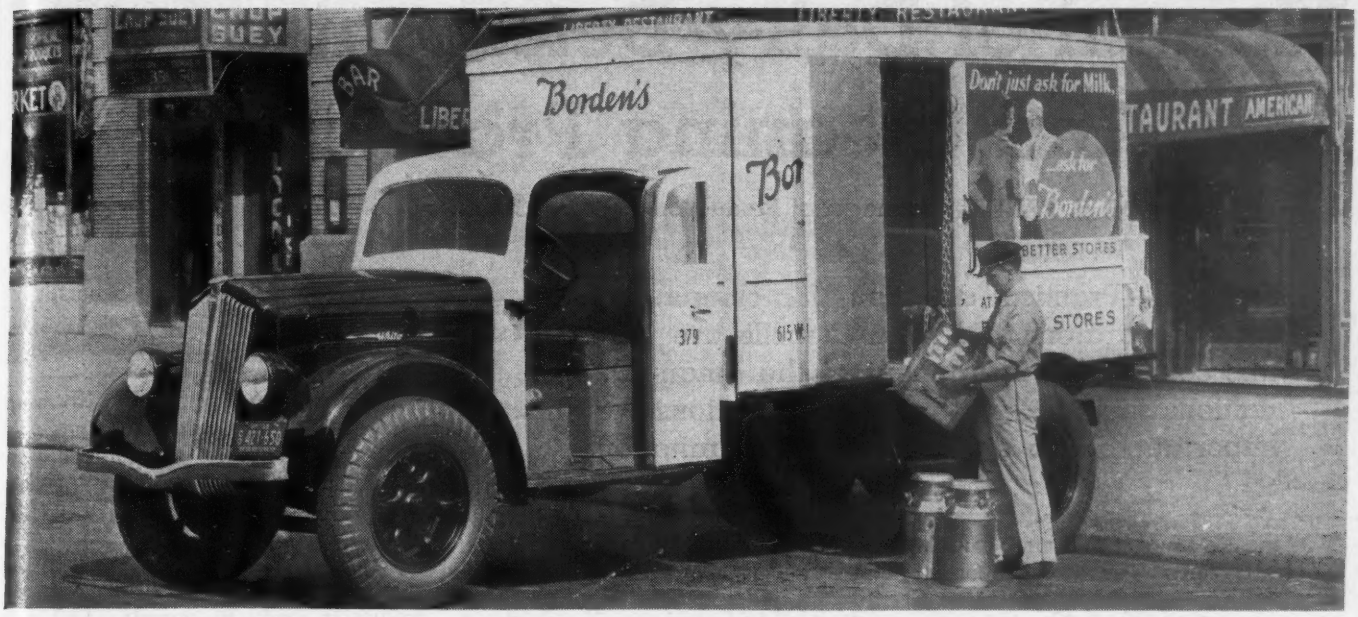
Sheffield has also cut down the total area of delivery, and in addition has adopted a widespread conservation program among its drivers—another method for maintaining automotive equipment. To save tires, the drivers were impressed with the necessity of avoiding sudden stops, except in cases of emergency, of eliminating side-wall scuffing, and, above all, of seeing that their tires were properly inflated. To save gas, they were cautioned to shut off the engines if the trucks were to be standing idle for long periods of time. Accident prevention was stressed, since accidents might take trucks out of service and use up the comparatively small number of spare vehicles on hand.

In line with vehicle maintenance, Sheffield Farms had a preventive maintenance system in effect long before such a program was advocated by the ODT. To minimize the number of major repair jobs to be done in the company's main shops, the company employed two mobile repair trucks to visit the smaller branches and make on-the-spot repairs.

The three companies have been able to obtain sufficient replacement parts, although on such items as cylinder blocks, crankshafts and valves there has been considerable delay. In some cases, Borden has used outside workshops for metal spraying to build worn parts such as crankshafts, axle shafts, and water-pump shafts.

Under the auspices of the ODT Borden also has assisted in the formation of a general fleet-owner maintenance

All available instruments and mechanical equipment are employed to cut down man-hours in Borden repair shops, in order to offset the man-power shortage. At the left, a tester uses an instrument on a company tractor. To the right, chassis lubrication is being done mechanically with a portable high-pressure unit which does the job quickly.



An early morning wholesale delivery being made by one of Borden's white panel body trucks with a separate cab, and a quick in and out folding, two-part door. Adequate maintenance is keeping these trucks in good condition during the emergency.

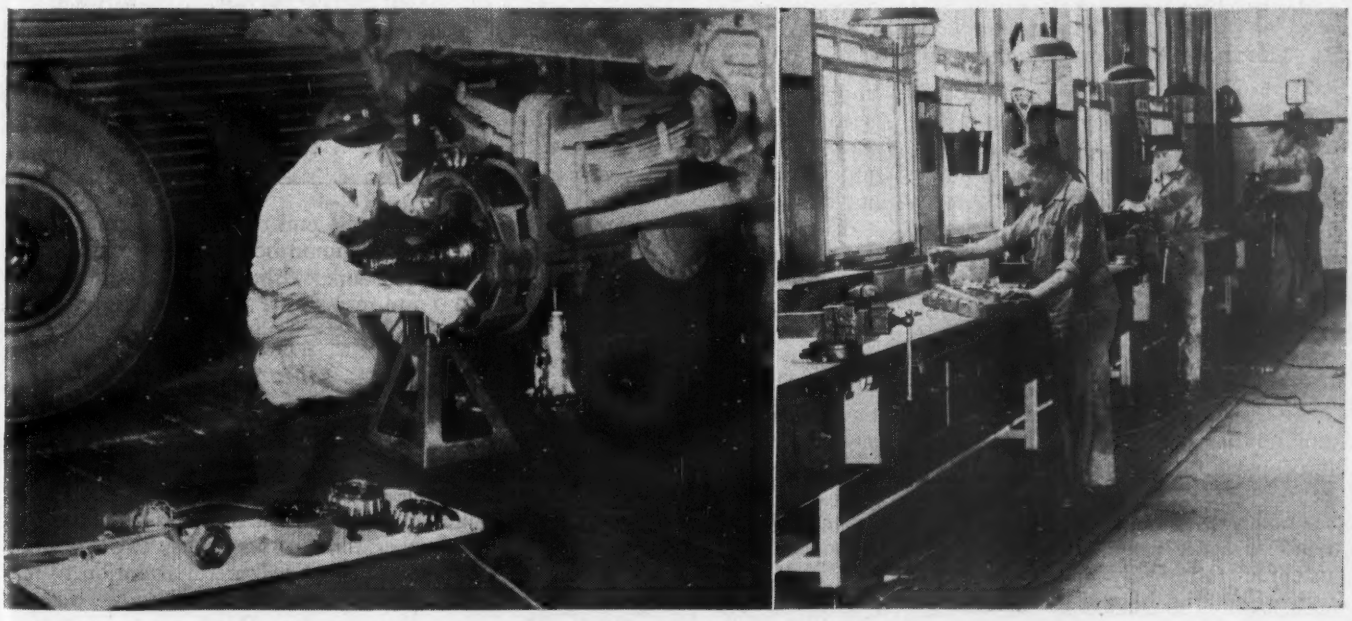
and repair committee in its local area. The work of this committee is to obtain the replacement parts ordered and to line up a group of smaller competent repair shops capable of doing overflow work which cannot be done in the regular repair shops. As a means of checking on its repair work, the company has been using a system of outside analysis of engine lubrication oil samples. At regular intervals, the samples are taken from the engine crankcase and sent to an oil-testing laboratory. The laboratory sends back a report on each sample, giving the amount and kind of dilution and the character of the foreign substances found in the oil. These reports are interpreted to determine what repair work needs to be done.

Drivers Report Faults

For years the Heinz company has used a faulty-condition blank to be filled out daily by each driver. These filled-in blanks are used to correct mechanical defects found on the trucks. In cities where Heinz maintains its own repair shops, the work is done there. Otherwise, it is performed by the local dealer who handles the particular make of truck involved. This procedure is used after the inspection of all Heinz trucks.

To bring about an even better engine performance, the trucks are equipped with thermostats and with winterfronts for cold weather.

All three companies recap their tires. Borden employs the services of a large tire company which recommends whether repair or recapping is needed, and Borden uses these reports as an additional check on proper inflation, wheel alignment and so forth.



Good light, air and a clean bench and floor provide excellent working conditions in a truck repair shop of The Borden Co. in New York City. On the left, a mechanic working on the rear brakes has put the wheel bearings and the hub cap on a tray instead of on the floor, which keeps grit off the parts and grease off the floor.

Manual of Dairy Detergents And Cleaning Practices*

By M. E. PARKER, Manager of Production, Beatrice Creamery Co., Chicago, Ill.

PART III—Practical directions for cleaning cream cans, separators and farm utensils are given in this concluding installment of the "manual." Directions include step-by-step instructions for this important phase of dairy industry sanitation

IN the cleaning of transport cans at the creamery, the most important step to insure dependable results is proper maintenance of the can washer itself. Too often automatic can washers are neglected and receive attention only when they fail to operate or when complaints begin to accumulate regarding unsatisfactorily washed cream cans. In other words, most automatic can washers are perpetual reminders of the truth of a modern stigma: "Too little and too late!"

From the purely engineering standpoint, modern power-driven can washers are properly designed to render dependable and exacting service. However, they are machines—they have no brains. They require attention; proper maintenance will pay dividends. Proper maintenance (in addition to careful mechanical operation) provides for frequent and thorough cleaning of the can washer itself.

Cleaning the Can Washer

To assure good results in the operation of a can washer, cleaning the washer by removing excessive scale and foreign matter as soon as such deposits become evident is desirable. In cases of only light scale deposit, this cleaning can be accomplished by washing, brushing and rinsing with the hose. In cases of heavy lime deposits, the solution tank is filled with clean water to which a good milkstone remover is added according to the manufacturer's directions. Then the machine is run with all pumps and nozzles open. (*Do not feed cans into machine during this cleaning period.*) The solution can then be drained out, any loose or softened scale removed with wire brushes, and the machine thoroughly rinsed with hot water from the hose. Replacements of some pipe may be found necessary after the scale is removed, because leaks formerly plugged by a deposit of scale will then show up.

Charging the Can Washer

Directions for use apply in general to machines of all styles and makes. If the machine is a single-pump unit, disregard the directions which apply to the rinse pump. Special instructions will be necessary to those using the Lathrop-Paulson Conservation type washer designed and constructed especially to use acid cleaner only.

Before starting the washing process, take care of the following:

1. Make sure that the machine is clean; that all spray pipes and nozzles are free from scale.

2. Fill the wash and rinse tanks with clear water.

3. Add cleaning compound in sufficient quantity to create a suitable cleaning solution in the wash tank; follow the manufacturer's directions. The amount will depend upon the volume of the water in the wash tank and the hardness of the water. Be sure the cleaning material is all dissolved before washing the cans.

4. Turn on steam and heat the wash water to 150 deg. F. or higher (be sure your thermometers are accurate and operating); heat the rinse water to 180 deg. F. or higher.

5. If the machine is equipped with automatic means for maintaining solution strength, be sure this compartment is fully charged and operating properly before starting to wash the cans.

6. Add water conditioner to the water in the rinse tank at the beginning of the operation. The amount to be added will be determined by the hardness of the water. The manufacturer's directions should be followed precisely. The purpose of the conditioner is to soften the rinse water. The initial charge at the beginning of the day's run generally is all that is necessary, although some operators prefer to maintain such charge by automatic feeding devices.

7. In washing cream cans, to have hot water for prerinsing is advisable. If the can washer is not so equipped, better results will be obtained by providing hot-water prerinsing.

Operating the Can Washer

After the preceding steps, the can washer is ready to operate. The two things that the operator needs to do during the run are: (1) See that *proper temperatures are maintained;* and (2) see that *a proper charge of cleaning compound is maintained* in the solution tank during operation. Automatic devices are available which provide the essential temperature and chemical controls, *but these are automatic only with adequate supervision.*

Listed in Table VII are the temperatures to be maintained and the volumes of water required.

TABLE VII—Temperatures and Volumes of Water for Can Washing.

	Temperatures
Wash tank	150 deg. F.
Rinse tank	180 deg. F.
Pump rinse	180 deg. F.
Clear hot-water final rinse	200 deg. F.
Steam sterilization	212 deg. F.
Air	250–270 deg. F.
	Volume of Water
Prerinse	2 to 3 pints (wasted to sewer)
Clear hot-water final rinse	4 pints (reused for pump rinse then wasted to sewer and 1 pint reused in wash tank)

At the end of the day's run, the machine should be thoroughly cleaned and the tank washed out. Remove, clean and reassemble spray nozzles and pipes.

Can Washing (Manual Method)

One of the weakest links in the procurement of cream supplies for buttermaking is found in the hand washing of cream cans and milk pails. Too frequently unclean water is used over and over for cleaning cans; clean water is required. Also, careful attention to temperature is essential. *Use an accurate thermometer.* Don't try to guess temperatures—invariably you'll be wrong.

The proper cleaning of cream cans

* Prepared for Research Committee of American Butter Institute.

and milk pails consists of these operations:

1. Rinse utensils such as milk pails, strainers and cream cans with *fresh* clean water (such as you use for drinking). In the case of cream cans, hot water (at least 165 deg. F.) should be used, while for milk pails and strainers, cold water should be employed. Discard the rinsings.

2. Wash the rinsed utensils with a *fresh* solution of a suitable washing compound. (Be sure to follow the manufacturer's directions regarding the amounts of cleaning compound to be used.) The washing solution should be tepid (105 to 115 deg. F.).

(NOTE: In the case of acid cleaners, the washing solution should be sprayed upon the utensils to be cleaned.)

3. Rinse the washed utensils with a *fresh* supply of hot water* (180 deg. F. or higher) to remove the dissolved or suspended dirt as well as the last traces of the washing solution itself. Invert the utensils on a rack to drain and dry.

4. Just before use, as a final precaution, the rinsed cleaned utensils can be given a final rinse with a chlorine solution containing at least 100 p.p.m. of available chlorine (follow manufacturer's directions).

(NOTE: In the case of acid cleaners, the chlorine solution can be replaced by a final light spray of acid cleaner solution which not only will prevent the growth of undesirable bacteria but will insure rapid and complete drying without the danger of corrosion or the formation of waterstone or milkstone deposits.)

Cleaning Separators

1. Immediately after separating and while the machine is still in operation, pour one or two quarts of *fresh* warm water (100 to 120 deg. F.) into the separator bowl.

2. After each separation, take the machine apart and, using a brush, wash with a *fresh* solution of washing compound, making sure to follow the manufacturer's directions.

3. Rinse all the parts thoroughly with *fresh* hot water (180 deg. F. or higher) and set them on a rack or shelf to drain and dry.

4. In the morning assemble the separator and, just before use, fill the bowl with a chlorine solution containing at least 100 p.p.m. of available chlorine (follow manufacturer's directions) and run solution through separator. The separator is then ready to receive the milk.

(NOTE: In the case of acid cleaners, the chlorine solution can be replaced by a final light spray of acid cleaner solution which not only will prevent the growth of undesirable bacteria but will insure rapid and complete drying without the danger of corrosion or the formation of waterstone or milkstone deposits.)

Cleaning Milking Machines

I. Immediately after milking:

1. Rinse the teat cups and rubber parts with *fresh* cold water, drawing it through several times, while the machine is still pulsating. Be sure to raise the teat cups out of the water several times to break the vacuum.

2. Follow the cold water rinse by drawing at least 1½ gal. of *fresh* hot water (not less than 165 deg. F.) through the machine. If hard water is used, a small amount of a suitable water conditioner or acid cleaner solution should be added, making certain to follow the manufacturer's directions.

3. Brush the pail and head of the milking machine with hot water and pour into a pail for washing the outside of rubber parts and pail.

4. Rinse the pail and the head of the machine with *fresh* hot water (180 deg. F.) and hang them up so that they can dry readily.

[NOTE: Rinsing the above with *fresh* hot water (180 deg. F.), followed by a final light spray of acid cleaner solution, will not only prevent the growth of undesirable bacteria but will insure rapid and complete drying without danger of corrosion or waterstone and milkstone formations.]

5. Fill the milk tube and teat cups with lye solution and allow to soak until next use.

II. Just before milking:

1. Drain the lye solution from the teat cups and milk tubes and rinse in fresh cold water.

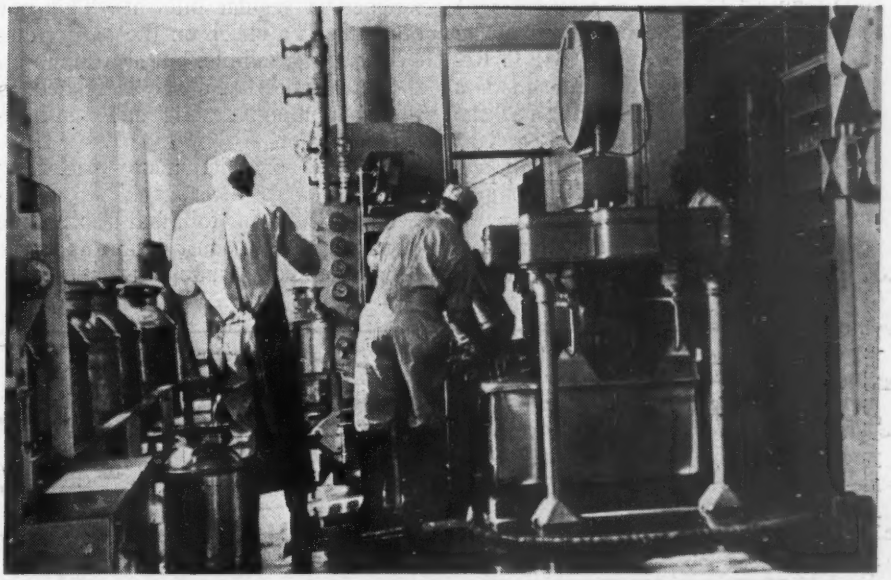
2. Assemble the units.

3. Draw at least one pailful of cold water containing 100 to 200 parts per million of available chlorine (follow manufacturer's directions) through the machine to remove all traces of lye solution.

4. Boil all rubber parts (teat cup inflations and milk line) for 5 minutes in a solution prepared by adding 1 heaping tablespoon of lye to each gallon of water. Then scrub rod, rinse and reassemble machine. Use an enamelware vessel. This should be done at least once a month.

[NOTE: Prepare lye solution by dissolving a 13-oz. can of lye in 1 gal. of cold water. Use earthenware crock or enamelware pan. Stir with a stick until all the lye is dissolved. Pour into a 1-gal. bottle and stopper the bottle. Paste a "Lye" label on the bottle and store the container away from children. Use ¾ cup (6 oz.) of this stock lye solution to 1 gal. of water. Never use this solution on aluminum teat cups.]

The air-line system used in connection with the vacuum should be cleaned every two weeks by running through a *fresh*, hot solution (at least 165 deg. F.) of a suitable washing compound. (Be sure to follow manufacturer's directions regarding the amounts to be used.) If milk is drawn into the vacuum line, the line should be cleaned immediately after milking, as previously directed.



This typifies an efficient arrangement in the can washing department of a dairy plant. Full cans come in on conveyor at left, and the milk is tested. Then the cans are dumped into the weightank and the empties are put into the can washer (center) immediately. The can lids pass through the upper section of the washer.

* In hard-water areas, treatment of the water is advisable to avoid waterstone deposits in the cleaned cans.

Improvement Needed in Technic For Testing Food Packages

By T. A. SCHWARZ California Prune and Apricot Growers Association, San Jose, Calif.

Standard terminology would give meaning to data on the characteristics of materials and packages. Author gives examples of proper testing methods and of suitable units for expressing the results

THERE is a serious lack of precise information in the field of packaging. One might suppose that a well-established industry would have developed standards of quality and performance for its products, which could be applied by the technologist in an intelligent planning of a given packaging problem. Such is, of course, not the case, and not only must the technologist check the producer's claims but he must develop his own specific standards to solve a particular problem.

Convenience demands some kind of scale by which to measure the efficiency of a packaging material as a barrier to the passage of water vapor. It is difficult to explain to the nontechnical executive the meaning of tests which express this efficiency in terms of weight loss per unit of time, but the reciprocal is easily understood. For practical purposes, the time required to produce a unit weight loss under standard conditions may be called "moisture loss time," MLT. Results are expressed as the time in days which must elapse until the package loses exactly 1 percent of its weight under the test conditions. To give two examples, the standard foil-wrapped Sunsweet prune package loses an average of 50 mg. per day in a test, and this is 0.01 percent of its weight, so that its MLT is 100 days. A package with a plain paper label loses 0.25 percent per day under the same conditions, with an MLT of 4 days.

Test Procedure

Our procedure in testing a wrapping material is as follows. The sample is cut into exact label size by means of a template and then fed into the Pneumatic Scale Co. tight-wrapping machine. The resulting packages are placed into a regular shipping case and permitted to cure in the stack for 24 hours. The samples are then transferred to a constant-temperature cabinet, together with some standard packages of identical history which might be termed blanks. After an additional 24 hours, when the rate of weight loss may be deemed constant, the packages are weighed for the first time, and from then on they are weighed at regular intervals. This not only affords a check on the barrier efficiency of the sample, but also shows up the mechanical qualities as related to folding, gluing, sealing and scuff resistance.

By this technic, many packaging materials were investigated as potential substitutes for foil, and also for the effect of package construction upon the overall protection afforded by the finished package. A few results are given in the accompanying table.

The limitation of this type of testing must now be considered. If one takes the rate of moisture loss for one week as a basis from which to calculate a figure for a period of 100 days, an error may be introduced because the moisture-loss rate will decrease as the material inside the package dries out.

There were no data available on the escape of moisture from rehydrated dried prunes, so it became necessary to investigate this phase separately.

Determination of Moisture Equilibrium

Obviously, the rate of drying out of a freely exposed material such as prunes or apricots depends primarily upon the vapor pressure exerted by the water of the material. The direct approach is, therefore, to determine the vapor pressure as such. An indirect method is also available through equilibrium humidities. Relative humidities are an expression of the partial pressure of water vapor in the system as a percentage of the full vapor pressure of water at the same temperature. For example, we find from the tables that the vapor pressure of water at 20 deg. C. is 17.5 mm. of mercury (68 deg. F. and 0.7 in.). If in a test we find a relative humidity of 50 percent, then the vapor pressure of water in that atmosphere is 8.75 mm. Both of these approaches require rather elaborate equipment, and a simpler approach was sought.[1] Although time-consuming, it is a reliable procedure, and the least cumbersome.

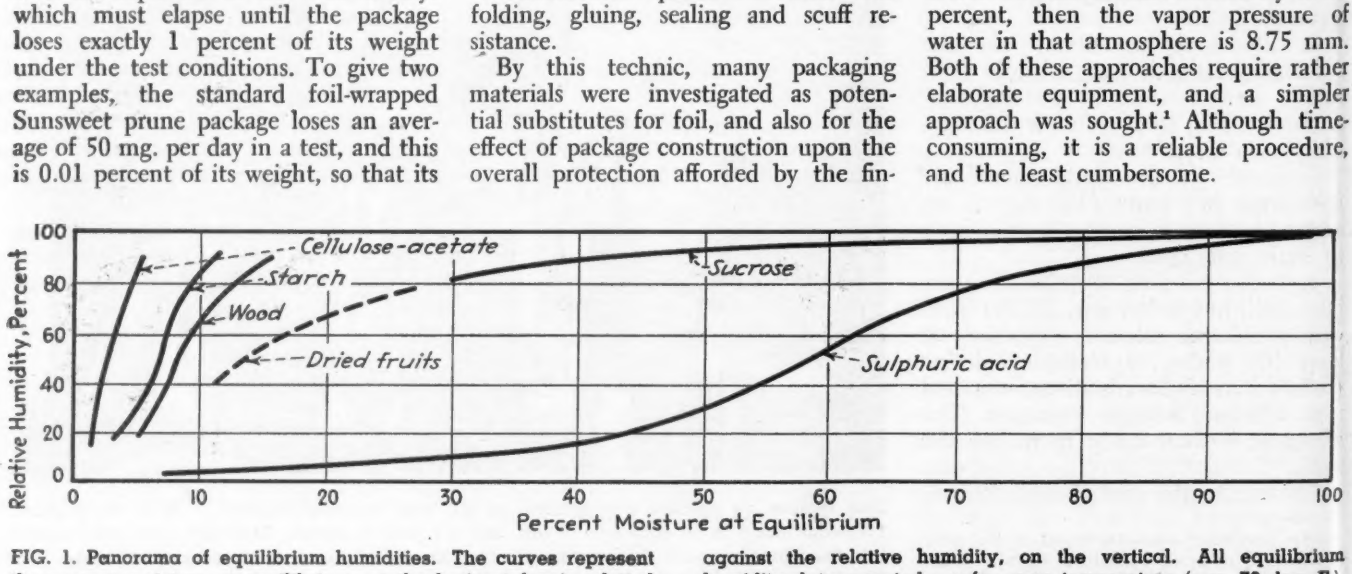


FIG. 1. Panorama of equilibrium humidities. The curves represent the percent moisture at equilibrium, on the horizontal axis, plotted against the relative humidity, on the vertical. All equilibrium humidity data reported are for room temperature (ave. 70 deg. F.).

In this method, the sample is exposed to air held at constant humidity by a hygrostatic solution until equilibrium is reached, after which the moisture content of the sample is determined. The following simple apparatus makes it possible to suspend the sample above the hygrostatic solution, and to weigh it without withdrawal from the flask. A 500-ml. wide-mouth Erlenmeyer flask, with a watch-glass cover that has a central aperture to hold a small cork, is quite satisfactory. The sample is hooked onto a piece of wire which, in turn, is forced through the cork. The protruding end of the wire is then bent into a hook that can be attached to the arm of a balance. Edge leakage is taken care of by taping with parafilm. The hygrostatic solution may be sulphuric acid, for which the vapor pressures have been worked out by Wilson,[2] and Wilson and Fuwa,[3] or a salt solution may be chosen from a standard reference such as the "Chemical Engineers' Handbook" (McGraw-Hill). These have the advantage of constant composition, provided the solution is in contact with an excess of the salt, so that drying of the sample does not affect the relative humidity.

Data on MLT for Various Types of Packages Containing Prunes

Type of package	Material under test	Moisture loss time (days)
Shell	Shell:	
	plain fiberboard	1–1.5
	K.B.	2–3
	Tredonite	35
Plain shell and liner	Liner:	
	dry waxed paper	3–4
	waxed laminated paper	16
	foil	40
Wrapper over standard shell plus liner	Wrapper:	
	common lithographed label	4
	Aluminized label	4–5
	M.P. cellophane Pliofilm	20–25
	Foil	100
	Foil combinations	150 and up

With this simple apparatus we have determined the equilibrium moisture content of a number of products at various humidities, and the results are plotted in Figs. 1 and 2. Fig. 1 gives a general picture of composition *vs.* equilibrium humidities for well-known materials. Dried fruit, in general, appears to follow a continuation of the curve for sucrose. The sucrose curve stops at saturation (68 percent), but if we may predict that there is no significant difference in the curves for invert sugar and sucrose, it is to be expected that dried fruit will follow an extrapolation of the sucrose curve until 12 to 15 percent moisture is reached. This seems to be verified by the available data. It is clear, however, that at moisture contents below 25 percent, differences arise within the fruits which become more pronounced as the moisture is lowered.

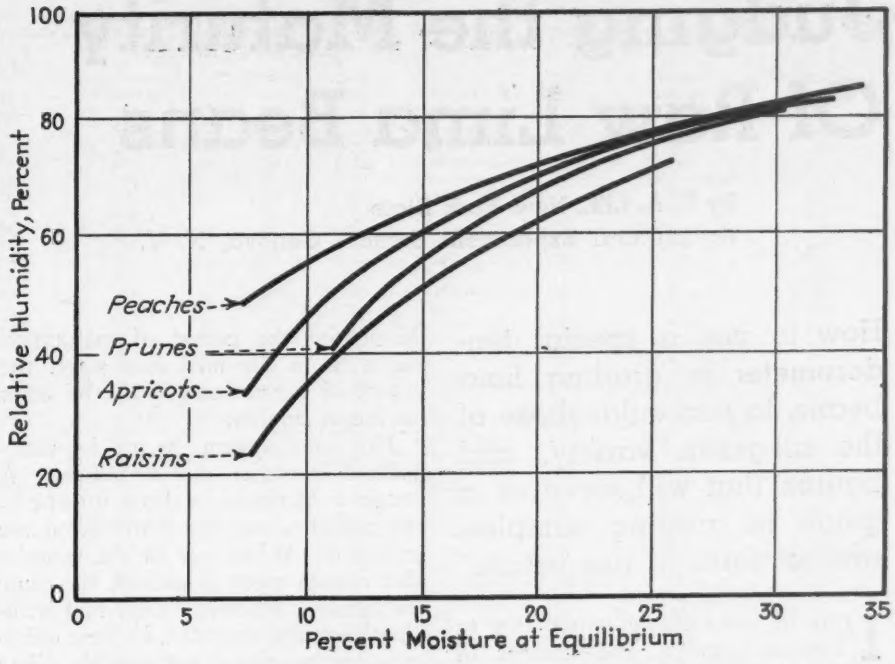


FIG. 2. Equilibrium humidities of various dried fruits, percent moisture plotted against relative humidity. All determinations were made a room temperature (average 70 deg. F.).

These graphs have been helpful. For example, at 20 percent moisture the relative vapor pressure of peaches and of apricots is higher than that of prunes at the same moisture content. This means that in mixed-fruit packages moisture will migrate from the cut fruit to the prune, and if the latter is near the borderline for spoilage, it may suffer in consequence.

Effect of Moisture in Sample on Results of Packaging Test

We may now revert to the packaging problem, to determine how serious an error is introduced in the drying of the sample for an MLT calculation. From Fig. 2, a reduction of 1 percent in the moisture content of prunes initially at 25 percent moisture means about 1 percent change in the relative vapor pressure. We have therefore to determine how this affects the vapor pressure differential, because this is the factor which determines the rate at which moisture passes through the packaging barrier. In an accelerated storage test, we have had a water-vapor pressure difference of 30.5 mm. of mercury (inside minus outside). If the package dries out to the extent of 1 percent, the vapor pressure inside the package is reduced by 0.5 mm. at 96 deg. F., and the difference is 30 mm.—a change of 1.6 percent. It may be assumed that the final MLT will be affected to the same extent. Within obvious limits, therefore, the change in moisture content may safely be neglected.

A knowledge of the moisture-escaping or -absorbing tendency enables us to extrapolate accelerated storage tests into actual field conditions. With a vapor-pressure differential of 30.5 mm., prunes in certain bags gave an MLT of 12.25 days. The same bags were subsequently stored in an ordinary storage environment where the v.p.d. was 5.6 mm. These should have shown an MLT of $12.25 \times \frac{30.5}{5.6} = 67$ days. The experimental value was 71 days, which is fair agreement considering the crudity of the experiment.

It should be evident that the vapor-pressure difference is the all-important factor in package testing. If we know anything about product distribution, we can set the limits of desirable package protection. Our own experiments have definitely shown that the overall protection which we obtain from a package is proportional to the moisture-vapor permeability of the most resistant member in the complete package. In our case this is the outer tight-wrap. If we arrange a series of packaging materials in order of ascending moisture impedance—say, paper, dry wax-paper, moistureproof cellophane, laminated glassines, foil and foil combinations—and form these materials into wrappers, the overall barrier efficiency of the packages will be in the same order.

Standard Terminology Needed

Insufficient grasp of the importance of the vapor-pressure difference has probably had a great deal to do with the

(*Turn to page* 124)

Judging the Maturity Of Raw Lima Beans

By F. A. LEE, New York State
Agricultural Experiment Station, Geneva, N. Y.

How to use a special tenderometer in grading lima beans, in particular those of the all-green variety, and figures that will serve as a guide in grading samples, are set forth in this article*

It is of considerable importance to freezers, canners and growers of lima beans to judge the maturity of the raw vegetable. The present system of determining the grade by color has been used for the Henderson's Bush variety because the bean changes from green to white as maturation progresses. However, with the introduction of the all-green varieties, in which the cotyledons remain green throughout the period of maturation and even in the final seed stage, the system of determining grade by color no longer applies.

This color system, in use by many packers, is carried out as follows: A sample is blanched in steam for one to two minutes, and the white beans are separated. When one of the varieties that remain green is packed, the same procedure is followed except that wrinkled beans are separated, because differentiation by color is not possible. The samples are then graded as 1, 2, 3, 4 or 5, depending upon the weight of the reject beans found. While the method has been considered satisfactory for beans of the Henderson's Bush variety and those similar to it, because sorting by color can be effected, it is unreliable for beans of the varieties that stay green, because the wrinkling of the hard beans is not dependable criterion. It is well to note, however, that in the case of the beans that turn white as maturation progresses, sometimes young beans turn prematurely white. Furthermore, older beans occasionally retain the color.

The "Tenderometer" has proven itself a practical device for the grading of raw peas for canning and freezing. The instrument in use at present permits a maximum reading of 250 lb. of shearing force to the square inch. It was constructed for this maximum reading because it was designed for peas, for which vegetable the limits provided are ample.

By arrangement with Food Machinery Corp., Hoopeston, Ill., maker of the Tenderometer, a special instrument was made which is capable of reading up to 550 lb. of shearing force to the square inch but which is equipped with a smaller sample chamber than that in the standard model. During two years, data were gathered under commercial conditions on lima beans of the Henderson's Bush and Clark's Allgreen varieties with a view to establishing this instrument as a practical method for the grading of lima beans.

At first, an attempt was made to compare the Tenderometer readings of the raw beans with the grade assigned to the lot based on the wrinkled beans after blanching. It was found, however, as an inspection of the data in Table I shows, that this latter test is not sufficiently reliable for this purpose. In many cases, if the wrinkled bean test had been used, the packer would have been paying for better beans than he was getting. These figures, however, are included to complete the data, and to caution packers about its failings.

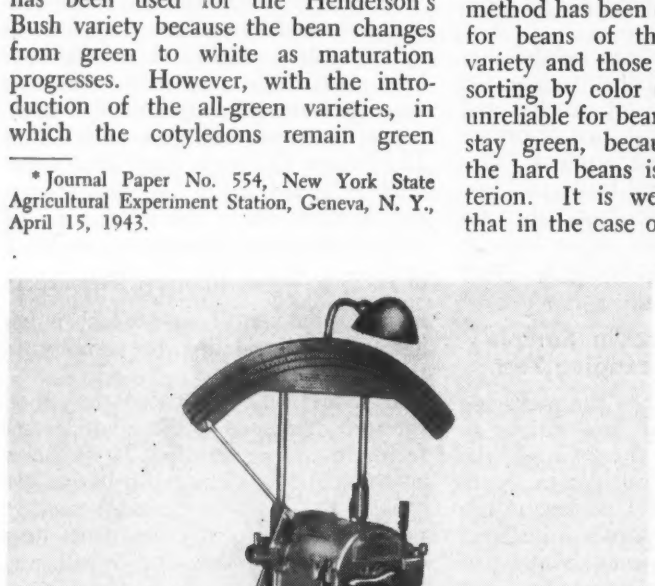
It was found that better results could be had by estimating the rejects from the brine separator and comparing these figures with the values obtained with the Tenderometer. Further Tenderometer readings were obtained on the blanched material.

Raw samples were washed, and stones and other foreign matter removed before Tenderometer readings were taken. Following this, the samples were blanched for 2½ minutes at 210–212 deg. F. before being cooled and put through the brine separator.

To avoid unnecessary duplication, the results of one year's work only are tabulated. Similar figures were obtained as a result of the first year's work. Table I shows the figures obtained for the raw beans and Table II shows those for the blanched beans.

In comparing the Tenderometer readings with the percentage of rejects, it must be remembered that the strength of the brine in the separator influences the quantity of the throw-outs. Samples Nos. 60 and 75 are low as far as rejects are concerned. However, hard beans went through with the good ones because the strength of the brine was too high, and it was necessary for these to be removed on the sorting belt. A decrease in the brine strength remedied this situation, by increasing the rejects.

* Journal Paper No. 554, New York State Agricultural Experiment Station, Geneva, N. Y., April 15, 1943.



The "Tenderometer," developed by American Can Co., with patents assigned to National Canners Association, is manufactured by Food Machinery Corp. The model used for lima beans and that used for peas vary only in internal construction.

Table I—Tenderometer Readings of Raw Henderson's Bush and Clark's Allgreen Lima Beans and Percentage of Rejects from the Brine Separator of Each Lot.

Sample No.	Date 1942	Variety	Grade *	Percent Rejects	Tenderometer Readings	Sample No.	Date 1942	Variety	Grade *	Percent Rejects	Tenderometer Readings
1	9/25	Henderson	2	few rejectsx	173	47	9/12	Clark	1	20	249
2	9/30	Henderson	1	few rejects	187	48	9/15	Henderson	3	not determined	249
3	9/25	Henderson	1	few rejects	192	49	9/22	Clark	1	10	250
4	9/25	Henderson	1	few rejects	194	50	9/25	Henderson	2	20	251
5	9/26	Henderson	1	few rejects	198	51	9/30	Henderson	1	not determined	254
6	9/30	Henderson	1	few rejects	203	52	9/25	Clark	1	10	255
7	10/12	Henderson	1	few rejects	204	53	9/22	Clark	1	10	255
8	10/12	Henderson	1	few rejects	205	54	9/15	Clark	1	not determined	257
9	9/23	Henderson	1	few rejects	205	55	9/14	Clark	1	20	258
10	9/25	Henderson	1	few rejects	211	56	9/22	Clark	1	10	258
11	10/12	Clark	1	few rejects	212	57	9/26	Clark	1	10	259
12	9/15	Henderson	2	few rejects	214	58	9/30	Henderson	1	15	259
13	9/30	Henderson	2	few rejects	214	59	9/12	Clark	1	30	260
14	9/28	Henderson	2	few rejects	216	60	9/28	Henderson	4	10°	265
15	9/28	Henderson	1	8	216	61	9/21	Henderson	3	not determined	265
16	9/30	Henderson	2	5	217	62	9/22	Henderson	4	not determined	265
17	9/13	Clark	1	10	217	63	9/25	Clark	1	15	265
18	9/30	Clark	1	5	218	64	9/25	Mixed		15	266
19	9/24	Henderson	1	5	222	65	9/12	Clark	1	30	272
20	9/28	Henderson	1	5	223	66	9/26	Clark	2	20	273
21	9/14	Henderson	2	10	224	67	9/16	Henderson	5	not determined	273
22	9/22	Henderson	1	5	225	68	9/25	Clark	2	20	274
23	9/12	Henderson	3	not determined	225	69	9/24	Henderson	3	15°	275
24	9/15	Henderson	3	not determined	226	70	9/12	Clark	1	30	275
25	9/22	Henderson	2	10	226	71	9/15	Henderson	4	not determined	275
26	9/22	Clark	1	5	226	72	9/22	Clark	1	20	278
27	9/12	Henderson	2	not determined	227	73	9/24	Henderson	2	20	278
28	9/30	Clark	1	6	228	74	10/12	Clark	2	20	280
29	9/24	Henderson	2	20†	229	75	9/23	Clark	1	15	285
30	9/22	Henderson	3	10	231	76	9/24	Henderson	3	20	288
31	9/12	Henderson	4	not determined	232	77	9/26	Clark	3	not determined	289
32	9/22	Clark	1	5	234	78	9/28	Clark	2	20	294
33	9/12	Clark	1	10	234	79	9/21	Clark	2	30	297
34	9/25	Clark	1	5	235	80	9/28	Clark	3	25	298
35	9/14	Henderson	3	not determined	236	81	9/21	Henderson	4	not determined	299
36	9/22	Henderson	1	15	236	82	9/21	Henderson	5	not determined	301
37	9/30	Henderson	2	5°	236	83	9/22	Clark	2	25	301
38	10/12	Clark	1	5	237	84	9/21	Clark	2	30	301
39	9/21	Clark	1	not determined	240	85	9/22	Clark	2	30	303
40	9/28	Clark	1	5	241	86	9/22	Clark	2	30	317
41	9/25	Clark	1	10	243	87	9/24	Henderson	3	30	325
42	9/14	Henderson	2	not determined	244	88	9/23	Clark	2	35	359
43	9/15	Clark	1	not determined	244	89	9/21	Clark	4	not determined	365
44	9/15	Clark	1	not determined	245	90	9/21	Clark	3	35	367
45	9/22	Henderson	2	10	248	91	9/26	Clark	2	35	394
46	10/12	Clark	1	5	249	92	9/25	Clark	2	40°	468

* Grade on basis of color (for Henderson) or wrinkles (for Clark).

x Few rejects=5% or less.

† Taking out all whites and some greens.

° Green and whites, therefore hard beans only were rejected.

In sample No. 29, the brine strength was too low, and some fancy beans were discarded as well as poor ones. This was doubtless the case with sample No. 59, although data on this point are not available. It is necessary that the strength of the brine be altered as the percentage of older beans in the sample varies, because older lots are used for green and white, or some other extra standard grade. These and other factors tend to produce inaccuracies in the percentage of rejects which explain the apparent minor inconsistencies in the table.

Because the Tenderometer readings vary directly with the increase in the age of the sample, these readings give the operator of the brine separator the information necessary to permit efficient separation of each lot. It is necessary, however, in the case of lima beans to take the average of two or three check readings to insure satisfactory results. With old beans, very close checks are not always easy to obtain, but an average of those taken give results that are entirely satisfactory from the practical point of view.

The readings of the blanched samples were not connected with the raw lima beans because these original samples were disrupted by the brine separator. These figures are included mainly to show the values that one might expect from the blanched vegetable.

The following values are suggested as tentative, and may be subject to some modification after thorough testing in commercial use.

Grade	Tenderometer reading
No. 1	240 and lower
No. 2	241–259
No. 3	260–279
No. 4	280–296
No. 5	297 and higher

Summary

The use of a special Tenderometer is described as applied to lima beans. Figures to be used as a guide in the grading of the samples are given.

(*Turn to page 132*)

Table II—Tenderometer Readings of Samples of Lima Beans after Blanching for 2½ Minutes at 210-212 deg. F. and Cooling.

Date 1942	Factory Grade	Tenderometer Reading	Remarks	Date 1942	Factory Grade	Tenderometer Reading	Remarks
9/28	Fancy Green	78	.....	9/15	Fancy Green	133	.....
9/22	Fancy Green	82	.....	9/28	Green & White	137	.....
10/12	Fancy Green	88	.....	9/29	Green & White	137	.....
9/25	Fancy Green	89	.....	9/22	Fancy Green	139	.....
10/12	Fancy Green	90	.....	9/28	Fancy Green	139	.....
9/28	Fancy Green	96	.....	9/28	Green & White	139	.....
10/12	Fancy Green	105	.....	9/22	Green & White	143	.....
9/29	Fancy Green	109	.....	9/28	Green & White	143	.....
9/25	Fancy Green	110	.....	9/28	Rejects	223	.....
9/22	Fancy Green	110	.....	10/12	Rejects	226	.....
9/25	Fancy Green	111	Blanched 3 minutes	9/12	Rejects	246	.....
9/25	Fancy Green	117	.....	9/15	Rejects	262	.....
9/13	Fancy Green	117	.....	9/13	Rejects	268	.....
9/28	Green & White	119	Blanched 3 minutes	9/25	Rejects	273	.....
9/22	Fancy Green	120	.....	9/28	Rejects	317	Wrinkled beans
9/16	Fancy Green	121	.....	9/25	Rejects	318	Wrinkled beans
9/12	Fancy Green	121	.....	9/28	Rejects	323	Wrinkled all greens
9/15	Fancy Green	125	Muck soil	9/15	Rejects	371	Wrinkled all greens
9/13	Green & White	127	.....	9/28	Rejects	389	Wrinkled all greens
9/13	Fancy Green	128	.....	9/29	Rejects	412	Wrinkled Hendersons
10/12	Fancy Green	132	.....				

Compressing Spray-Dried Milk To Save Shipping Space

By B. H. WEBB and C. F. HUFNAGEL, U. S. Department of Agriculture*, Washington, D. C.

Studies show that as much as 42 percent of the space occupied by dried milk can be saved by compression, 24 percent by jolting. Milks subject to different manufacturing conditions, however, may vary widely in their compression characteristics

IMPORTANT savings in the amount of shipping space taken up by spray-dried milk can be attained by compression and by jolting or bumping in wartime packaging operations. The savings in space effected by compression may be expected to range from approximately 21 percent for compression in a small package at a pressure of 500 lb. per square inch to 42 percent for die compression at 3,200 lb. per square inch. Jolting may be expected to save 11 percent of the space in a bulk package and 24 percent in a small package.

These possibilities of saving space in packaging dry skim and whole milks were determined in a recent study. Samples of powder were compressed at room temperature (75 deg. F.) in three specially made dies of different capacities. A laboratory hydraulic press was used, this being capable of exerting 16,000 lb. per square inch on the cake in the smallest die and 4,000 lb. on the material in the largest die. During rapid compression, the air in the powder did not have time to escape, so the compressed cake expanded when the pressure was released. Such a recovery in volume, amounting to 5 to 15 percent of the space saved by pressing, could probably be expected with automatic compression equipment. The figures given in this report allow for no expansion after pressing.

Another series of tests was conducted by jolting or bumping samples of powder in as uniform a manner as was possible by hand. The powder was placed in a can (capacity, 328 grams of water), jolted 1½ minutes and its density calculated.

Effect of Compression

Average values showing the effect of compression on the space occupied by dry milks are given in Table I and in Fig. 1. Different milks showed a variation from the data on the amount of space saved (Table I) of ±8 percent for skim milk and ±6 percent for whole milk.

Dry skim milk did not form a cake as well as dry whole milk. A skim milk cake compressed at 3,200 lb. per square inch retained its shape but was easily broken. Dry skim milk of normal moisture content could not be compressed into a definite cake at a pressure less than 2,400 lb. per square inch. At lower pressures a binder would be necessary. Dry skim milks with a moisture content greater than 6 percent were compressed to a firm cake at 1,700 lb. per square inch pressure. A powder of 8 percent moisture yielded a hard cake at the same pressure. Since dry skim milks with a moisture content in excess of 3 percent are poor in keeping quality, the use of moisture as a binder cannot be considered.

Dry whole milk readily formed a good cake at a pressure of 2,400 lb. per square inch. Some samples would probably form a cake at lower pressures. Cakes of skim milk pressed at 3,200 lb. and whole milk pressed at 2,400 lb. could be crushed readily to a powder with a rolling pin. When thoroughly crushed, they could be reconstituted with water as easily as the original powder.

A few preliminary observations did not indicate that compression of dry whole milk increased its keeping qualities. The compressed whole-milk cake contains about 10 to 20 percent air by volume, which may be more difficult to remove during nitrogen packing than the air in the loose powder.

Dry skim and whole milks were com-

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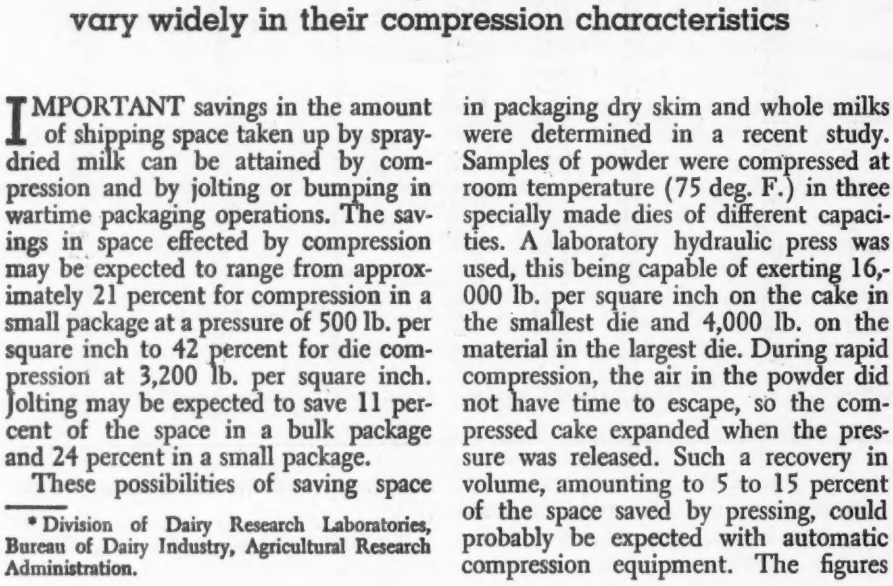

FIG. 1. Effect of compression at different pressures upon the volume reduction of spray-dried milks. The hardness of the cake is indicated as is the effect of jolting upon volume. Volume reduction figures are based upon densities of 0.60 and 0.55, respectively, for the loose skim and whole milks.

pressed in paper containers that were fitted tightly into a supporting form. At pressures up to 500 lb. per square inch the space saving was 16 to 26 percent. It was difficult, however, to fit the paper container into the mold tightly and smoothly enough to prevent damage to it during compression at higher pressures.

Results of Jolting

Consideration was given to the possibility of reducing the space occupied by the milk powder by vigorously jolting the package during filling. The space saved by jolting small packages of dry skim milk and dry whole milk was 27 percent and 21 percent, respectively. These percentages corresponded to savings obtained by compressing dry skim milk at 550 lb. and dry whole milk at 100 lb. per square inch. Jolting made an important saving in space, especially with dry skim milk, which was packed in 6-oz. containers to a density of 0.82 by this method. Packing dry skim milk by jolting the container could be done with simple equipment, and there would be no need to use a binder or to transfer fragile cakes to packages, as would be the case with compression. Furthermore, there would be no need to break up the cake before reconstitution. Data on the effect of jolting upon the density of powder are given in Table II.

Small packages were more easily packed to a high density by jolting than large ones. Skim milk packed in bulk containers should be shaken or jolted while the container is being filled. A density of 0.70 represents about the tightest pack that can be attained in large units. This would yield a 7 to 18 percent saving, depending upon the density of the original dry skim milk.

Some of the data from Tables I and II have been used in the preparation of Fig. 1, which presents a comparative view of the effect of a compression at different pressures and of jolting in reducing the volume of dry milks.

Compressibility Varies

Some powders can be jolted or compressed to higher densities than others, depending somewhat upon the method of manufacture. The differences in the compressibility of a skim milk powder, as affected by the concentration of the skim milk at the time of spraying, was investigated with a laboratory Gray-Jensen spray-drying unit. The following figures show the density of compressed dry skim milk which was spray-dried at various concentrations and compressed at 3,200 lb. per square inch.

Total solids content when sprayed (%)	Density
27.6	0.74
31.6	0.75
35.3	0.79
40.5	0.83

Laboratory powder is lighter than the commercial product, but the relationship shown here can be expected to apply to plant production.

The values which result from the calculations of space saved by compression of dry milks will be influenced by the density figures which are chosen to represent the original powders. In this report, density values of 0.60 for dry skim milk and 0.55 for dry whole milk have been used. Approximate volume reductions for dry milks of other densities may be calculated from the density figures given for various types of packing.

Characteristics of Packages

The information in Tables III and IV is the result of an analysis of the characteristics of various dry skim milk containers and packages which were available for examination. Certain barrels, and data concerning them, were furnished by a dairy products manufacturer. The density of the skim milk as packed in these containers varied from 0.55 to 0.80. A density of 0.63 may be considered as an average value.

Skim milk powder in the ordinary slack barrel is actually packed to a higher density than 0.55 to 0.60. This is the calculated value based on the interior volume of the barrel without liners. The double paper liners are bulky and reduce the effective volume of the container. If the strength of the slack barrel would permit it, a pack of 250 lb.

TABLE I—The Effect of Compression on the Density of Spray Dried Skim and Whole Milk.*

Pressure (lb. per sq. in.)	Dry Skim Milk Density	Space saved (%)	Properties of cake	Dry Whole Milk Density	Space saved (%)	Properties of cake
0	0.60	....	.....	0.55	....	.....
200	0.78	23.1	no cake	0.73	24.6	no cake
400	0.81	25.9	no cake	0.75	26.7	no cake
800	0.84	28.6	no cake	0.79	30.4	crumbles
1,200	0.87	31.0	no cake	0.82	32.9	fragile
1,600	0.89	32.6	crumbles	0.86	36.0	weak
2,400	0.93	35.4	weak	0.93	40.8	firm
3,200	0.97	38.1	firm	1.01	45.5	hard

* The values are averages from duplicate and triplicate determinations made on several different milks. Samples at zero pressure were loose and unpacked.

$$\text{Space saved (\%)} = \frac{\text{final density} - \text{initial density}}{\text{final density}} \times 100$$

TABLE II—Effect of Jolting on Density of Spray Process Dry Skim and Whole Milk*

Commercial samples	Dry skim milk Density	Dry skim milk Space saved (%)	Dry whole milk Density	Dry whole milk Space saved (%)
1	0.80	25	0.74	26
2	0.85	29	0.67	18
3	....	....	0.68	19
Average	0.82	27	0.69	21

* Six-ounce packages were jolted by hand for 1 1/2 minutes. Calculations are based on the following density figures of the unpacked powder: skim milk 0.60, whole milk 0.55.

A laboratory hydraulic press with different sizes of dies was used to compress spray-dried milks. The pile of loose dry milk is sufficient, when reconstituted, to make 1 gal. of whole milk. The two blocks of powder (right) show the volume reduction attainable by compression of this quantity of dry milk.

Bulk containers used for packaging dry skim milk (described in Table III). (1) 15-gal. tight oak barrel; (2) 30-gal. tight oak barrel; (3) slack barrel; (4) 50-lb. cylindrical metal container; (5) fiber container, one section open.

TABLE III—Characteristics of Some Bulk Containers Packed With Spray-dried Skim Milk.

Container		Gross shipping space (cu. ft.)	Gross shipping weight per lb. of powder (lb.)	Interior volume of package (cu. ft.)	Quantity of skim milk per package (lb.)	Density of skim milk in package	Quantity of skim milk per cu. ft. of shipping space (lb.)
Slack barrels:	1	9.5	1.12	5.8	200	0.55	21.05
	2	9.5	1.11	6.0	225	0.60	23.68
	3	9.5	1.10	6.0	250	0.67	26.32
Oak barrels (30 gal):	1	7.5	1.25	4.0	180	0.72	24.00
	2	7.5	1.24	4.0	190	0.76	25.33
	3	7.5	1.23	4.0	200	0.80	26.60
Oak kegs (15 gal.)	1	3.8	1.35	2.0	85	0.68	22.37
	2	3.8	1.33	2.0	90	0.72	23.68
	3	3.8	1.31	2.0	95	0.76	25.00
Fiber box*:	1	1.88	1.27	1.41	56	0.64	29.80
	2	1.88	1.23	1.41	64	0.73	34.00
Cylindrical metal container		2.1	....	1.33	50	0.60	23.80
Square metal container		3.0	....	2.51	112	0.71	37.30

* 120 point solid fiber double box; dividers; calculated on basis of 4 corrugated 8x8x9 1/2 in. inside boxes filled to either 14 or 16 lb. of skim milk.

TABLE IV—Characteristics of Some Commercial Consumer Size Containers Packed With Spray-dried Skim Milk.

	Shipping space occupied (cu. in.)	Interior volume of package (cu. in.)	Quantity of skim milk packed per unit (oz.)	Density of skim milk in package	Quantity of skim milk per cu. in. of shipping space (oz.)
1. (Not in cake form).....	27.3	22.3	8.2	0.64	0.30
2. (Not in cake form).....	23.6	21.9	8.0	0.64	0.34
3. (Not in cake form).....	46.6	39.8	17.5	0.76	0.37
4. (Compressed block).....	10.5	10.0	5.0	0.87	0.48

of dry skim milk (Table III, slack barrel 3) would save space. But before strengthening the slack barrel, tight oak barrels should be given careful consideration.

Paraffine-lined Tight Barrels Excellent

Paraffine-lined tight oak barrels (Table III) have been tested and found to be excellent packages for dry skim milk, especially for export shipment. The barrels are moisture- and possibly gas-tight and may be floated ashore and stored in exposed places without damage to their contents. They cost about 1 cent per pound of powder more than the slack barrel. Dry skim milk was packed in these barrels to a density of 0.75 to 0.80. The moisture pickup after storage of a barrel at 110 deg. F. and 80 percent relative humidity for four months was 1 percent, and the powder was uncaked and in excellent condition.

The rectangular fiber box was the best shaped container for saving space, but it lacked strength and moisture-tightness. Dry skim milk was packed in this box to the extent of 16 lb. per quarter (density 0.73), in place of the recommended 14 lb. (density 0.64). A less bulky liner than the one furnished with the cartons was necessary to accomplish this. The box itself might require strengthening if the heavier pack were used.

Summary

Savings in shipping space approximately of the order given below may be expected after packaging spray-dried milks as indicated. It must be emphasized that milks subjected to different manufacturing conditions may vary widely in their compression characteristics. A variation of ±6 percent from these figures may be anticipated, depending upon methods of processing and whether the milk is whole or skim.

Type of packing	Saving in space (%)
Compression in die:	
1,000 lb. per sq. in.....	31
2,400 lb. per sq. in.....	38
3,200 lb. per sq. in.....	42
Compression in small package:	
500 lb. per sq. in.....	21
Jolting in small package.....	24
Jolting in bulk package.....	11

The rectangular package yields maximum package volume per unit of shipping space. The 30-gal. paraffine-lined tight oak barrel for bulk shipments of dry milks affords strength, buoyancy, moisture- and possibly gas-tightness, and ease of handling. It is the best nonmetallic bulk package for dry skim milk under severe weather and handling conditions, and may also be suitable for dry whole milk.

This Is What It Costs To Dehydrate Vegetables

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PART IIB—Discussion of processing costs, which began in August, is concluded in this installment. It is essential to profitable operation to know what operating costs are and what factors affect them. Helpful facts and figures are given here

IN CONCLUDING the discussion of operating costs in vegetable dehydration, which started in the August issue of FOOD INDUSTRIES, there are presented here facts about preparation, drying, packaging, warehousing and indirect and overhead costs.

Preparation Cost. The preparation of a vegetable for drying is usually understood to include all of the steps that take it from storage through the last operation prior to loading on trays or belts for drying. If the product is blanched on trays, tray loading is a drying cost and blanching expense is still a preparation cost. The major steps for most vegetables are: (1) Feeding to preparation line; (2) sorting; (3) washing; (4) sizing; (5) peeling; (6) trimming; (7) slicing, dicing, cutting, stripping, ricing, and so forth; (8) washing; (9) blanching; and (10) disposing of waste. These may be in proper order for some but not for others; certain of the steps will not be necessary in all cases, and additional operations may be needed for some products.

Two factors in preparation largely determine the economy of operation—the judicious use of labor and the yield of prepared product from unprepared. Equipment costs are also important but are usually small in the long run, compared to the cost of labor displaced. Total labor may run as high as a third of all processing costs, and preparation labor is by far the largest single cost item or combination of items in preparation alone. Capital and operating charges on preparation equipment amount to only a small fraction of preparation labor in most vegetable dehydration plants. Studies on labor efficiency and labor replacement offer a most promising means for effecting reductions in operating costs.

Increased output per employee may be achieved by proper training and intelligent supervision. A piece-work or bonus system, coupled with rigid supervision and inspection, usually results in lower labor costs, especially in the trimming operation. A reduction in the number of workers can often be made by more uniform operation, the elimination of process steps or the installation of labor-saving equipment. The importance of the last point is sometimes underestimated, even in large plants.

Figure 10 shows roughly the value of equipment that can be purchased and operated with specified amounts saved in labor costs. The following assumptions have been made: Interest and taxes, 10 percent per year; repairs and maintenance, 10 percent per year for 1-year and 2-year write-offs, 15 percent per year for a 5-year write-off and 20 percent per year for a 10-year write-off; hourly operating cost per $1,000 of investment, 10 cents; number of hours operated per year, 24 hours per day,

* Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, U. S. Department of Agriculture.

TABLE VII—Estimated Costs Per Dry Pound of Dehydrated Vegetables, Exclusive of Overhead Costs and Profits.
(In a dehydration plant handling 50 tons per day, unprepared basis.)

Item	Table beets	Cabbage	Carrots	Onions	Potatoes	Sweet potatoes	Rutabagas and turnips
Form in which prepared	Slices	Shreds	Cubes	Slices	Strips	Slices	Slices
Pounds per 5-gal. container	10	6	14	9	10	13	8
Assumed overall shrinkage ratio	13 to 1	19 to 1	10 to 1	14 to 1	7 to 1	4½ to 1	10 to 1
Processing costs per dry pound	Cents	Cents	Cents	Cents	Cents	Cents	Cents
Labor, direct and indirect [1, 2]	8.5–13.5	10.0–15.0	6.0–10.0	11.5–16.0	6.0–10.0	3.5–5.5	6.0–10.0
Containers [3]	4.0	6.5	3.0	4.5	4.0	3.0	5.0
Utilities [4]	1–2	1–2	1–2	1–2	1–2	1–2	1–2
Total	13.5–19.5	17.5–23.5	10.0–15.0	17.0–22.5	11.0–16.0	7.5–10.5	12.0–17.0
Raw material costs per dry pound							
Cost at $20 per ton	13.0	19.0	10.0	14.0	7.0	4.5	10.0
Cost at $25 per ton	16.5	24.0	12.5	17.5	9.0	5.5	12.5
Cost at $30 per ton	19.5	28.5	15.0	21.0	10.5	7.0	15.0
Cost at $35 per ton	23.0	33.5	17.5	24.5	12.5	8.0	17.5
Cost at $40 per ton	26.0	38.0	20.0	28.0	14.0	9.0	20.0
Cost at $45 per ton	29.5	43.0	22.5	31.5	16.0	10.0	22.5
Total costs per dry pound, not including overhead costs or profit [1]							
Raw material at $20 per ton	26.5–32.5	36.5–42.5	20.0–25.0	31.0–36.5	18.0–23.0	12.0–15.0	22.0–27.0
Raw material at $25 per ton	30.0–36.0	41.5–49.5	22.5–27.5	34.5–40.0	20.0–25.0	13.0–16.0	24.5–29.5
Raw material at $30 per ton	33.0–39.0	46.0–52.0	25.0–30.0	38.0–43.5	21.5–26.5	14.5–17.5	27.0–32.0
Raw material at $35 per ton	36.5–42.5	51.0–57.0	27.5–32.5	41.5–47.0	23.5–28.5	15.5–18.5	29.5–34.5
Raw material at $40 per ton	39.5–45.5	55.5–61.5	30.0–35.0	45.0–50.5	25.0–30.0	16.5–19.5	32.0–37.0
Raw material at $45 per ton	43.0–49.0	60.5–66.5	32.5–37.5	48.5–54.0	27.0–32.0	17.5–20.5	34.5–39.5

[1] The low limit of labor cost is a summation of the low estimates for each individual operation, as shown in Table VIII; it is very unlikely that any plant will operate with an absolute minimum of labor in all operations.
[2] See Table VIII for cost details.
[3] The cost of packaging includes 25 cents for a single 5-gal. can and 30 cents for the wire-bound wood box holding two cans; the total per can is 40 cents.
[4] In natural-gas areas, many plants are operating at a cost of less than 1 cent per dry pound for utilities—gas, electricity and water. Utilities may run considerably over that amount in high-cost regions. Such costs have been roughly estimated to range between 1 cent and 2 cents per dry pound. A more accurate estimate is not warranted since the plant location, type of fuel and operating procedures are not specified.

200 days per year. A decrease in labor costs of only one dollar per hour will pay the operating and capital charges on a machine costing $4,000 with a 5-year write-off.

A uniform flow of product along the preparation line is essential for the most economical operation. An even flow requires fewer employees and smaller equipment than does an irregular or spasmodic flow. Losses caused by temporary shutdowns are often large. Most items of cost continue during shutdowns with the exception of raw material and packaging supplies not used and a small amount of utilities. It may not be practical to save labor costs by dismissing the help because it is usually impossible to anticipate the length of a shutdown.

The amount of loss due to a shutdown may be roughly estimated by assuming that the sale value of the lost production less the cost of materials saved (raw material and containers) is an actual loss. For example, a shutdown of the preparation line, due to a shortage or raw material, results in loss of 20 cents for each pound of lost production if the selling price of the product is 35 cents per pound and the combined raw material and container costs are 15 cents per pound. This amounts to $100 per hour in a plant which normally turns out 500 lb. of finished product per hour.

Careful treatment of the raw product through all stages of preparation reduces the processing costs per dry pound by increasing yields. The two steps in preparation that offer the best opportunity for decreasing material losses are peeling and trimming.

Most abrasive peelers have the tendency to overpeel smaller vegetables and underpeel larger ones. It is preferable, therefore, to put only one size through this type of peeler at a time. Proper control of liquid temperature and exposure time must be maintained in lye, brine and similar types of peeling operations. Variations will usually result in increased losses of raw material. Overheating causes excessive abrasion and washing losses, and underheating causes excessively heavy trimming losses.

The care and skill exercised by trimmers have an important effect on material losses. Proper training and supervision are especially important for trimming personnel. The plant operator should know at what point a further increase in trimming rates results in excessive raw material losses. A saving of only 5 percent of the raw product by slower and more careful trimming will pay for the employment of two extra employees if the hourly labor cost per employee is $1.00, including overhead, and the plant is handling one ton per hour of raw product costing $40 per ton. If the plant processes 5 tons per hour, 10 additional trimmers could be justified by a 5 percent material saving.

The efficient operation of each item of equipment is most essential. The manner in which a machine is operated may cause variations in processing costs greater than the capital charges on the machine. For example, some cutters produce a considerable amount of chaff unless fed at optimum rate.

The problem of waste disposal is properly a part of preparation. The quantity and kind of waste is largely the result of the preparation method. For instance, flame or radiant-heat peeling causes a less serious sewage problem than abrasive peeling because the quantity of waste is much smaller. Lye peeling results in a waste product that may require special treatment, depending upon the disposition made of it.

Preparation costs include the following main items: Labor; equipment charges; utilities—mainly water, power and fuel for providing steam; chemicals such as salt and lye; waste disposal—cost of disposal and/or credit for sale of peels, trimmings, and so forth; other expenses, including indirect and overhead costs.

Drying Cost. Drying covers the processing operation after delivery from the blancher up to and including delivery from the finishing bins. If no bins are used, drying costs end with emptying of the trays or belts. Equipment charges are a larger proportion of the drying cost than is the case with preparation. For most vegetables, a few employees operate a piece of drying equipment that may cost as much as all of the preparation equipment put together, or even more.

A minimum of labor costs can be achieved by the use of a dryer using a continuous belt, or, in the case of a tray dryer, the installation of all practical labor-saving methods and devices.

The cost of heat and power for many products may not amount to over 1 cent per dry pound. Direct-fired gas heat is nearly always more economical than indirect heat with coal or oil. The installation of properly designed units is an engineering problem, but the capital charges and operating costs of these units can be a subject of cost analysis even before the unit is built or operated. Allowable temperatures, maximum or minimum humidities, and desirable drying times are predetermined technologically. Within the range of these conditions, the plant operator must find the most economical point of operation. Figure 11 shows the approximate cost of heat and power for evaporating 100 lb. of water with different percentages of recirculation, with an outside temperature of 60 deg. F. and 60 percent relative humidity. The following assumptions have been made: Cost of fuel oil, 3 cents per gallon, or coal, $5.50 per ton; cost of electricity, 1½ cents per kwh.; 60 percent fuel efficiency;[1] constant air flow; maintenance of a constant wet-bulb depression at the cool end. Under the conditions mentioned, 75 percent recirculation is most economical. For any particular vegetable, and for different weather conditions, similar charts can be drawn. It is possible that minimum costs may not be obtainable under conditions that are optimum from the standpoint of product quality. The plant operator must often determine the best compromise among the three factors—product quality, product cost and plant output.

[1] This efficiency does not include the heat efficiency of the dehydrater. Even when the fuel efficiency is 100 percent, as it is in direct-fired dryers, the heat efficiency of dryer may be only 30 to 40 percent.

TABLE VIII—Labor Cost Per Dry Pound in Vegetable Dehydration.

(In plants handling 50 tons per day, unprepared basis)

Vegetable	Output per hour, dry basis [1] (Pounds)	Labor cost per hour: Direct and supervisory [2] Men (Dollars)	Women (Dollars)	Foreman (Dollars)	Forewomen (Dollars)	Total (Dollars)	Indirect [3] (Dollars)	Total (Dollars)	Labor cost per dry pound (Cents)
Table beets	320	11.25–16.50	12.00–22.20	1.25	.85	25.35–40.80	2.05 to 2.30	27.40 to 43.10	8.6 to 13.5
Cabbage	220	11.25–14.25	7.20–15.60	1.25	...	19.70–31.10	2.05 to 2.30	21.75 to 33.40	9.9 to 15.2
Carrots	420	9.75–15.00	12.00–23.40	1.25	.85	23.85–40.50	2.05 to 2.30	25.90 to 42.80	6.2 to 10.2
Onions	300	11.25–14.25	19.20–29.40	1.25	.85	32.55–45.75	2.05 to 2.30	34.60 to 48.05	11.5 to 16.0
Potatoes	600	9.75–15.00	22.20–39.60	1.25	.85	34.05–56.70	2.05 to 2.30	36.10 to 59.00	6.0 to 9.8
Sweet potatoes	925	9.75–15.00	18.00–29.40	1.25	.85	29.85–46.50	2.05 to 2.30	31.90 to 48.80	3.4 to 5.3
Turnips or rutabagas	420	9.75–15.00	12.00–23.40	1.25	.85	23.85–40.50	2.05 to 2.30	25.90 to 42.80	6.2 to 10.2

[1] Average hourly output per 24-hour day.
[2] Assumed hourly labor rates: Men, 75 cents; women, 60 cents; foreman, $1.25; forewoman, 85 cents. Number of employees taken from Table IV.
[3] Indirect labor is estimated as follows: Bookkeepers (1 or 2), $0.75 to $1.50 per hour; stenographer (1), $0.65; payroll clerk (1), 0.75; superintendent (1), 1.50; field man (1), 1.25; plant chemist (1) 1.25; total (6 or 7), $6.15 to $6.90 per hour. Since this indirect labor charge will be applicable to three shifts, the approximate cost chargeable to each hour's output will be one-third, or $2.05 to $2.30.

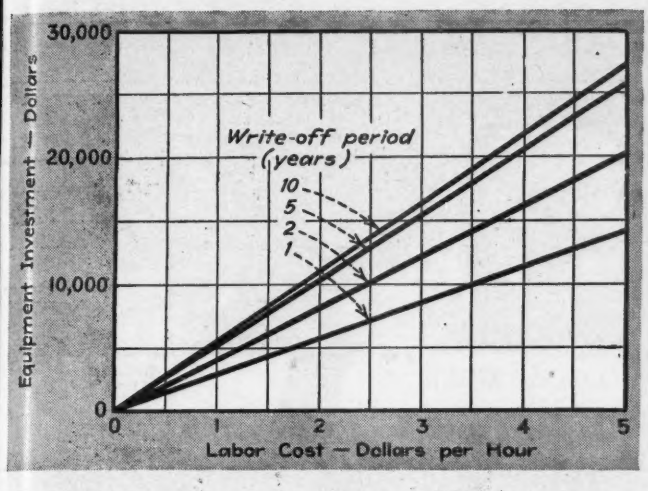

FIG. 10. Equipment investment which is justified by savings in labor costs.

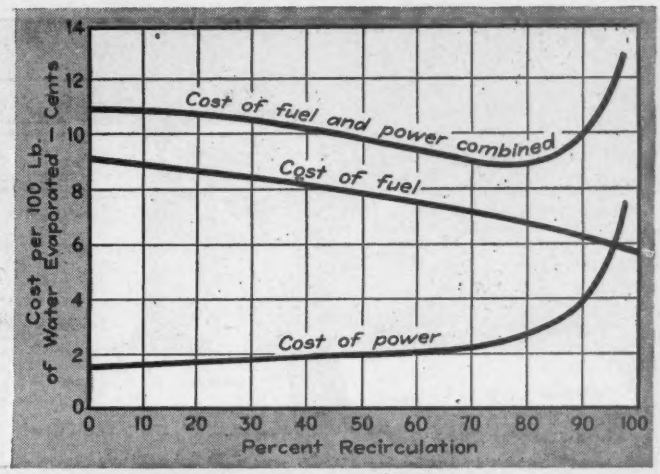

FIG. 11. Cost of evaporating water in air-blast dryer at various percentages of recirculation.

Discussions of operating costs usually assume a balance between the preparation line and the dehydrater. Obviously, the balance is disturbed by anything that changes the capacity of the preparation line or the dehydrater. Suppose, for example, that the output of the preparation line is increased as a result of improvement in raw material, thus increasing the amount of material fed to the dryer. If the dehydrater has reserve heating capacity, it may be possible to dry the increased quantity by decreasing the amount of air recirculated, thus shortening the drying time. (The alternative expedient of increasing tray loading may be undesirable from the standpoint of quality because of increased drying time, and, for the same reason, may not increase the quantity of material the dehydrater will dry in a given period of time.) The increase in fuel cost due to lower heat efficiency will usually be more than offset by the value of the increased output of the plant. In other words, if there is no shortage of fuel, fuel economy is relatively less important than labor efficiency.

The main items of drying expense, without regard to order of importance, are: Labor, equipment charges, fuel and power costs, other expenses, including indirect and overhead costs.

Packaging and Warehousing Costs. For purposes of discussion, several operations are included in this group, as follows: (1) Final inspection; (2) air desiccating; (3) grinding; (4) packaging—filling, replacing air with inert gas, sealing, labeling, and boxing or crating; (5) warehousing or car loading.

Final inspection might logically be included in a separate group. It is, however, a relatively minor operation, and for that reason, is included here instead of in an independent classification. The number of inspectors varies according to the quality of the raw material, care used in preparation, and quality of drying, as well as the requirements of the purchase specifications or grade standards.

The main items of packaging expense, not necessarily in order of importance are: Containers, labor, utilities (including air desiccation), inert gas, equipment charges, other expenses, including indirect and overhead costs.

Indirect and Overhead Costs. Indirect and overhead costs are included together since there is apparently little to be gained in attempting to separate them. Costs that cannot be directly and wholly charged to any of the groups mentioned previously are included in this group as follows:

1. Administrative salaries and expenses.
2. Interest on investment and taxes.
3. Depreciation of plant and equipment.
4. Rental of building or equipment not chargeable directly.
5. Insurance on plant. (Labor insurance is a cost of labor.)
6. Factory clerical salaries and expenses.
7. Laboratory salaries and expenses.
8. Equipment and building repairs and replacements not chargeable directly.
9. Laundry.
10. Clean-up labor and janitorial services.
11. Vacation labor.
12. First-aid supplies and expenses.
13. Transportation of help.
14. Miscellaneous supplies and expenses.

In distributing these various expenses to the different steps of operation, each item of overhead or indirect cost theoretically should be analyzed and prorated separately on a basis equitable for that particular expense. In actual practice, it is not always practicable to do this. It is advisable, however, to handle as many items as possible in this manner. For those items not handled separately, a grouping is satisfactory. Laundry, vacation labor, transportation of help and other similar charges can be equitably distributed on a labor basis. Depreciation, insurance and taxes, maintenance and repairs, and so forth, are more logically spread on an equipment investment or other similar basis.

Individual treatment of each item is also preferable in distributing indirect and overhead expenses among the various products handled. This method of distribution should be used wherever practical. Charges not so handled can be grouped and distributed on a basis equitable for the group, such as one or more of the following: Value of finished product, time dehydrater is used on each product, quantity of material produced, direct labor cost, raw material cost.

The size of the dehydration plant is a factor determining the degree of detail used in prorating each item. In a small plant, too much attention to such details is unwise. In a large plant, considerable detail is warranted.

Estimated Processing Costs. Tables VII and VIII present a partial summary of estimated processing costs in vegetable dehydration. The cost elements included are raw material, direct and indirect labor, packaging and utilities. The bases on which the estimates of costs were made are explained in the footnotes to the tables.

Other indirect and overhead costs have not been included in this calculation. Some operators believe that total overhead costs should not average more than 50 percent of direct labor, while others say that these costs may be equal to or even greater than the cost of direct labor. Still others believe that overhead costs have no relation to labor and cannot be accurately estimated on a labor basis. Wide variations occur from plant to plant due to the fact

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This shows the actual amount of shreds or flour, peel or meal, and water obtained from one pound of potatoes.

Potatoes Baked, Then Dehydrated To Avoid Loss of Product*

By OLOF E. STAMBERG and HOBART BERESFORD,
Agricultural Experiment Station, University of Idaho, Moscow, Idaho.

Experiments indicate that the yield is increased and, in addition, the peel is recovered for use as feed. Not only is waste eliminated, but a sewage problem is solved, because the peels are dried

BY baking potatoes before dehydrating them, the yield of the dehydrated product may be increased over the yield for the potato dehydration processes now generally employed. In addition, that portion of the potato which does not go into dehydrated food is saved for feed, a factor that is important considering the feed shortage. Two principal types of dehydrated potatoes are produced at present—the Julienne type, in which the potatoes are diced or cubed and then dried, and potato shreds, which are made by passing boiled potatoes through a ricer and then drying as sheds. Some potato flour has been produced for a number of years, but this is primarily used in bakery products.

In making both the shreds and Julienne types of dehydrated potatoes by present methods, the potatoes are washed and then peeled by abrasion peelers or by the lye or the brine process. After peeling, the remaining eyes or defective portions are removed by hand as the potatoes are carried along on inspection conveyors.

Such methods are wasteful, especially when blanching is used ahead of abrasive peeling. In addition to the skin, about 20 percent of the exterior portion of the potato may be removed. And the final yield of dehydrated potato is sometimes as low as 50 per cent of the total solids content of the raw material—for every ton of dried product, approximately an equal quantity of peel and potato is wasted. Aside from the economic loss, this large volume of waste has created a number of serious waste disposal problems.

The Baked Potato Process

A small experimental unit was built for our studies of the baked potato dehydration process, and the process is outlined on the accompanying flow-sheet. The potatoes were first washed and the excess water removed by a few minutes of fan drying. Then the potatoes were baked for 1 hour at 400 deg. F. in an electric oven.

Immediately after baking, the potatoes were peeled by hand, the operator wearing gloves. The peeling was done in a manner similar to that which would be used in a rapid, large-scale operation —only a few motions are necessary to remove the peel from the hot potato. The interior portion of the baked pota-

TABLE I—Data on Baked Potato Dehydration Process

	Large potatoes	Medium potatoes	Small potatoes	Average
Average weight, grams	257.4	170.1	107.3	178.3
Loss in weight during baking (%)	15.67	16.23	18.69	16.86
Dry material of potatoes (% recovered)	23.72	22.48	24.44	23.55
Dry material as shreds (% of total)	72.38	70.92	65.19	69.50
Dry material as peel (% of total)	27.62	29.08	34.81	30.50
Crude protein in shreds (% dry basis)	11.26	10.88	10.16	10.77
Crude protein in peel (% dry basis)	11.51	11.59	11.70	11.60
Phosphorus in shreds (% dry basis)	0.235	0.254	0.263	0.251
Phosphorus in peel (% dry basis)	0.249	0.264	0.272	0.262

*Published with the approval of the director of the Idaho Agricultural Experiment Station as Research Paper No. 219.

to was passed to the ricer, while the peels were placed on trays ready for the peel drying unit. The shreds from the ricer were extruded on trays and immediately removed to the dehydrater.

The shreds and the peels were dried for 4 or 5 hours at 150 deg. F., and the final moisture content of the finished products varied between 5 to 7 percent as determined by the vacuum-oven method. The peel portion was then ground into a fine meal. If it is desired to produce potato flour, the shreds also can be ground.

Yields

Idaho Russet Burbank potatoes were used for these studies, and the data from three drying operations using large, medium and small potatoes are shown in the Table I. The amount of moisture lost during baking averaged 16.86 percent, based on loss of weight, and it is evident that the smaller potatoes with the larger surface area lost more moisture than the larger potatoes.

The average amount of dry material (shreds and peel) recovered was 23.55 percent, and this practically represents the total solids content of the potatoes since there was no significant loss of material. About 70 per cent of this dry material was in the form of shreds, and the remaining 30 percent was peel. The effect of potato size and surface area is again noticeable in that the larger potatoes gave a higher yield of shreds and less peel as compared to the small potatoes.

Analyses of Dry Material

Protein and phosphorus determinations were made on both shreds and peel to obtain indications of their value as food and feed, respectively. Both the protein and the phosphorus contents appear to be slightly higher in the peel portion of the potato than the interior portion. It must be remembered that the portion referred to here as peel actually represents about 30 percent of the exterior portion of the potato, only a small part of which can truly be called peel. A phosphorus content of 0.26 percent and a protein content of 11.60 percent should make the peel portion valuable in the face of the present feed shortage.

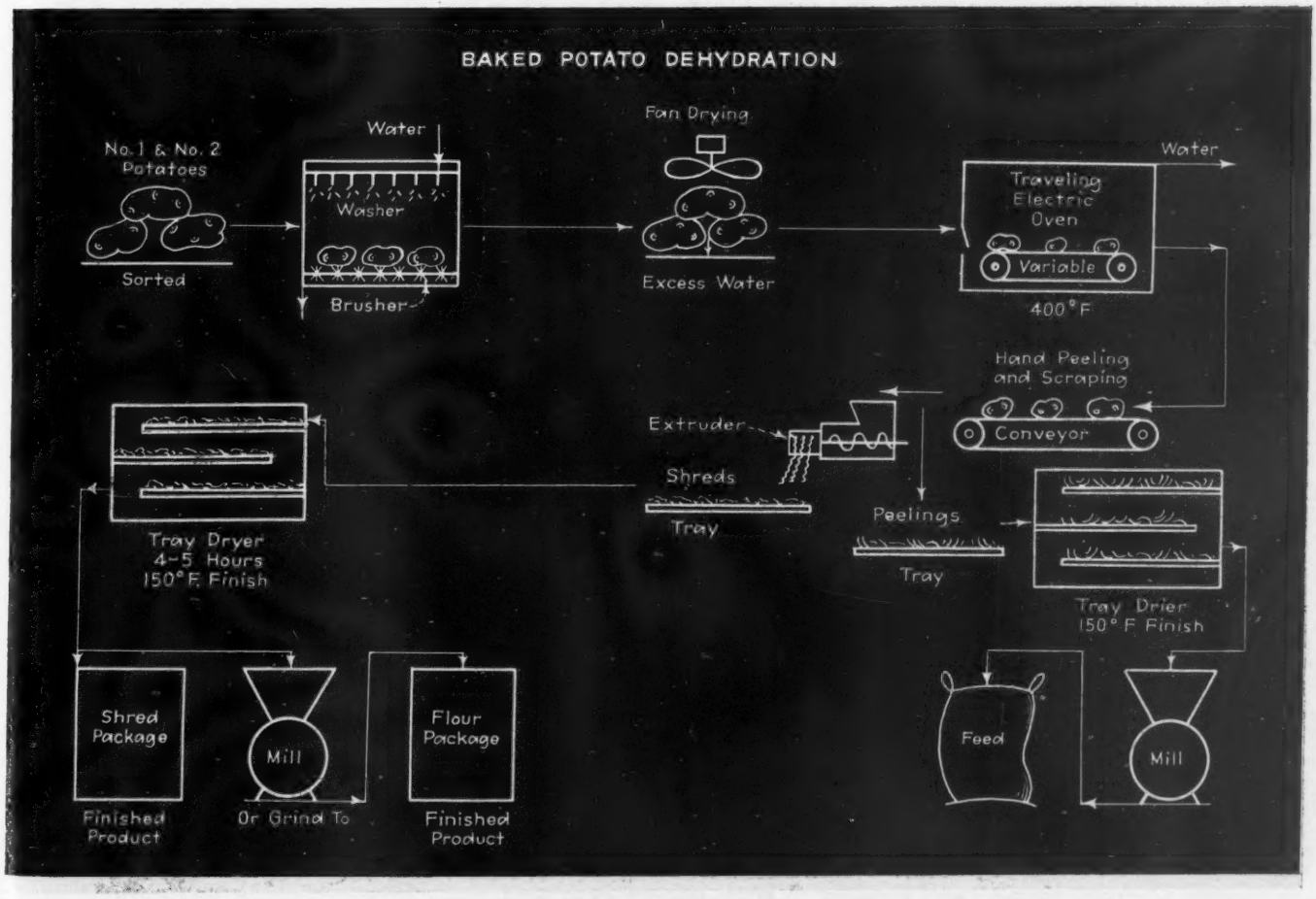
The shreds reconstitute readily in hot water in 5 to 10 minutes, about one part by weight of shreds being used to about four parts of water. The resulting product resembles mashed potatoes after some mixing.

Discussion

In the processes now used for dehydration, considerable amounts of steam or hot water are used, especially for blanching, and cold-water washing is employed in the dicing operation. The water has a leaching effect, and probably some of the soluble nutrients are lost. The only water used in the baked potato process is for the scrubbing and washing necessary to remove the dirt from the whole potato.

The amount of hand labor necessary to peel the baked potatoes should not be much greater than the hand labor now used to remove the eyes and other undesirable portions of the potato. Furthermore, the increase in yield of about 30 to 50 percent obtained should well overbalance any increase in cost for the hand peeling operation. Actually, the whole process might prove much cheaper in commercial operation, considering that no hot water or steam is necessary, and considering the amount of peel portion obtained.

There are many important operating details which must be observed for the successful use of the process, but these cannot be discussed fully in this brief report.



Flowsheet for baked potato dehydration process.

Converting Old Cans Into Crowns

Brewer gets 1,100 gross a week of extra-quota caps from reclaimed tinplate. Salvage operations are simple but efficient

By A. H. HAFFENREFFER, JR.
Haffenreffer & Co., Inc.
Boston, Mass.

TWO salvage operations which make available extra-quota crowns for bottling operations have been developed by Haffenreffer. One of these methods for meeting the crown shortage is the reconditioning of used crowns so that they again may be put onto bottles, this operation being described in the August issue of FOOD INDUSTRIES (page 76). The second operation, and one which produces extra-quota crowns to the extent of about 1,100 gross a week, is the reclaiming of tinplate from old tin cans of gallon or larger size and sending the metal to a crown manufacturer to be made into bottle caps.

The cans from which the tinplate is salvaged in this second operation cost nothing except for the expense of collecting by one small truck from hotels and restaurants. The labor required for the operation is not extensive, only four men being needed on the reclaiming line. And the salvaging equipment is something put together from the scrap pile or from idle equipment about the plant. But it should be pointed out here that all bottlers using crowns made from cans have had the sad experience of some of the bottles breaking at the neck before the cap comes loose.

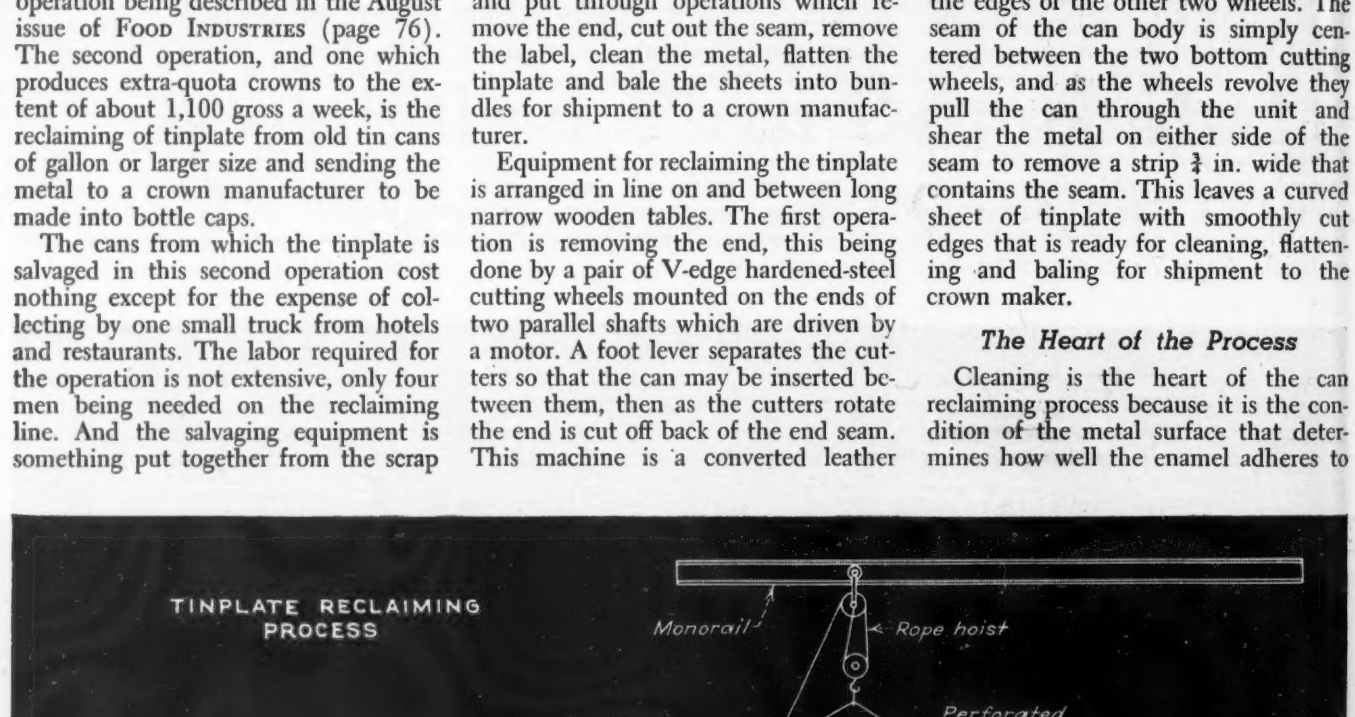
For this tinplate reclaiming operation, the cans collected from the hotels and restaurants are piled in a 20x20-ft. fenced-in yard and sheltered by a roof from the elements. The cans from this stockpile are then taken inside the plant and put through operations which remove the end, cut out the seam, remove the label, clean the metal, flatten the tinplate and bale the sheets into bundles for shipment to a crown manufacturer.

Equipment for reclaiming the tinplate is arranged in line on and between long narrow wooden tables. The first operation is removing the end, this being done by a pair of V-edge hardened-steel cutting wheels mounted on the ends of two parallel shafts which are driven by a motor. A foot lever separates the cutters so that the can may be inserted between them, then as the cutters rotate the end is cut off back of the end seam. This machine is a converted leather beader, the cutting wheels replacing the beading units and the foot lever being added to separate the cutters for insertion of the can.

Adjacent to the end remover and driven by the same ½-hp. motor is the machine that cuts out the seam. This machine has two flat-edge cutting wheels mounted on the same shaft and spaced ¾ in. apart. Located above these two wheels is a third flat-edge cutting wheel, the periphery of which rotates between the edges of the other two wheels. The seam of the can body is simply centered between the two bottom cutting wheels, and as the wheels revolve they pull the can through the unit and shear the metal on either side of the seam to remove a strip ¾ in. wide that contains the seam. This leaves a curved sheet of tinplate with smoothly cut edges that is ready for cleaning, flattening and baling for shipment to the crown maker.

The Heart of the Process

Cleaning is the heart of the can reclaiming process because it is the condition of the metal surface that determines how well the enamel adheres to



Flowsheet of operations for salvaging tinplate from old tin cans.

the finished crown. The following procedure worked out at Haffenreffer's delivers a truly clean metal sheet.

Labels on the curved tinplate strips remaining after the end and seam are removed from the cans are softened by soaking the strips in a vat of 190-deg. water, this vat being 11 in. deep and having a screen 3 in. off the bottom. Portions of the labels not loosened by soaking are removed by a workman with a steel scraper.

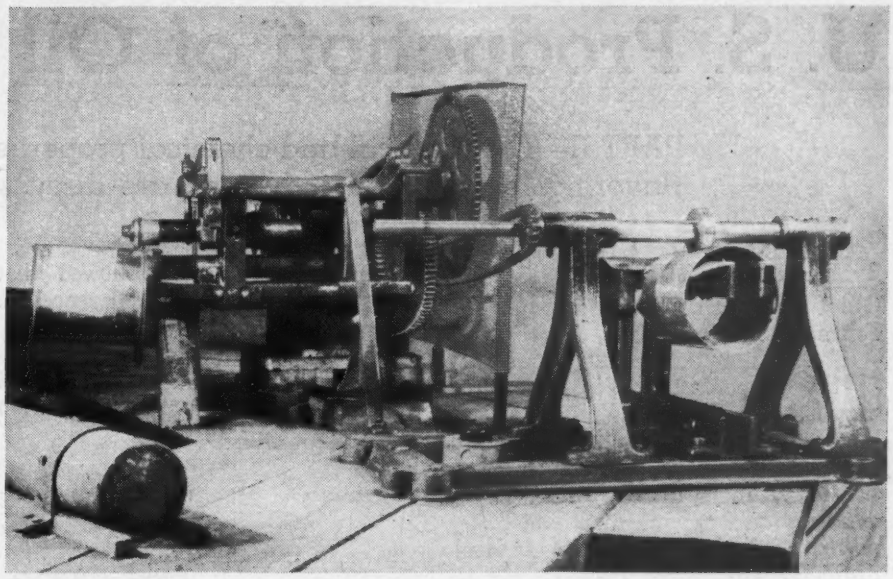
After the labels are removed, the metal strips are placed in perforated steel baskets handled by a rope-and-pulley hoist which travels on an overhead monorail conveyor. In these baskets, the strips are lowered into a 10-bbl. tank of 155-deg., 1 percent mild soap solution. After ten minutes in this cleaner, the baskets are transferred, again by hoist and overhead conveyor, to a 10-bbl. tank containing a 3 percent mild soap solution at 155 deg. F., where they remain for another ten minutes. Next, the baskets are immersed in 180-deg. rinse water in a 2-bbl. tank.

Now cleaned, the strips of tinplate are dried on a steam radiator laid on its side in a recess in a wooden table. This operation requires but two minutes. Then a workman wipes any traces of foreign material from the metal.

All that remains to be done now is to flatten the curved strips of tinplate and bale them into bundles for shipping. Flattening is done by passing the strips through steel rollers driven by a ½-hp. motor, a guard being provided to keep the fingers of the workman out of the rolls. Three hundred and fifty of the flattened sheets are stacked in a converted cider press, squeezed into a compact bundle and fastened together with three strands of No. 12 iron wire. Boards placed over and under the stack of sheets before pressing form part of the bundle. Openings in the platform of the press permit insertion of the baling wires. The bales of tinplate sheets are now shipped to the manufacturer who makes crowns from them.

High Heat Efficiency

An interesting part of this cleaning operation is the efficiency with which the cleaning and rinsing baths are heated. Condensate from the steam coils in the second 10-bbl. cleaning solution tank is used in the label soaking vat. Although live steam heats the first cleaning tank with the 1 percent solution, steam coils heat the second one with the 3 percent solution. This prevents dilution of the stronger solution with live steam and makes it unnecessary to change it often. The rinse water is heated by live steam, as dilution is of no consequence.

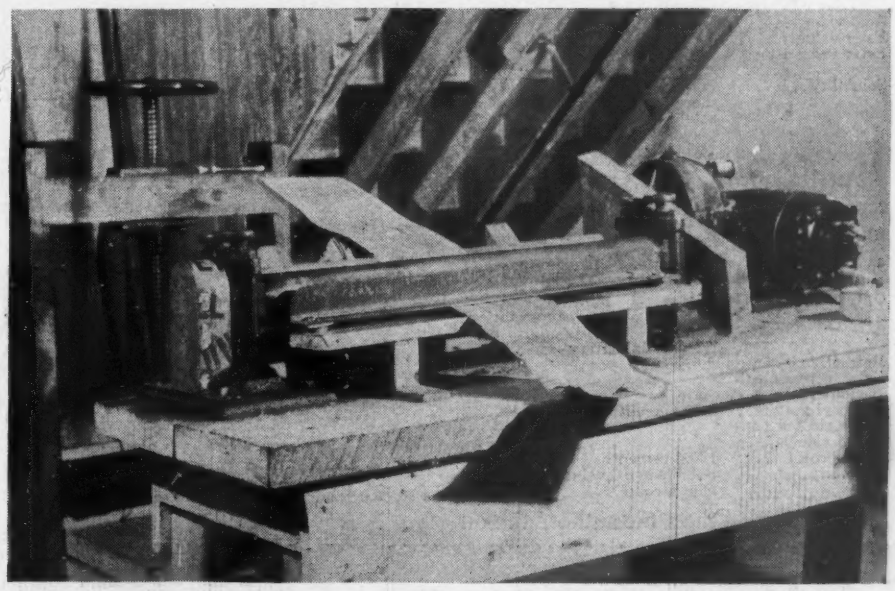


These are the first two operations in the tinplate reclaiming process. At left is the cutter which removes the end of the can. At right is the cutter that takes out the seam to leave a curved sheet of tinplate. The two machines are driven by the same motor.

Costs of the Operation

To reclaim tinplate from cans requires the labor of one man on the road to collect the cans with a small delivery truck. One man is required to operate the cutter that removes the end, and another runs the seam remover. The two men work together getting the cans from the storage yard and delivering the sheets to a third man who scrapes off parts of the labels remaining after soaking and controls the cleaning baths. A fourth man inspects and wipes the metal strips, flattens them and puts them into bales. These men work seven hours a day and spend the eighth hour cleaning the removed ends and bad cans for salvage and cleaning up the department.

The four inside men and one outside man produce 800 bales of sheets daily, or 4,000 weekly, which yield 1,100 gross of crowns. The labor cost for the five men is the principal item of expense, but $15 weekly must be allowed for the truck and $10 weekly for extra charges—transportation of the finished bundles to the crown company, cleaning materials and accessories. The crown manufacturer charges 17 cents a gross to make the crowns from the sheets.



Here you see one of the sheets of tinplate cut from a used tin can in position between the rollers which flatten it preparatory to baling. In left background is the converted cider press which squeezes stacks of the sheets into a compact bundle for shipment to a crown manufacturer.

U. S. Production of Oil of Sage

PART II—The physical and chemical properties of an important flavoring for the food industries are discussed here in detail

By ERNEST S. GUENTHER
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Fritzsche Brothers, Inc., New York.

THE characteristic delicate odor and flavor of sage is caused by the volatile or essential oil present in the leaves. For distillation purposes, the plant material in Dalmatia is cut with sickles, cleaned from adhering earth and transported on donkeys to the nearest local distillery. After a few days' storage in barns, or under sheds, the plants are sufficiently dry for distillation. Steam, generated in a separate steam boiler, is blown through the plant material in the stills. After one hour, distillation is completed and the oil is drawn from the Florentine flask.

At the beginning of the harvesting, the yield of oil is sometimes as high as 2 percent, but it decreases to about 0.7 percent toward the end of the campaign; on the average, the yield amounts to 1.4 percent.

Physical and Chemical Constants

According to Gildemeister and Hoffman,[4] the constants of oil of sage vary between the following limits:

Specific gravity at at 15 deg. C....	0.914 to 0.930
Optical rotation...	+2 deg. to +26 deg.
Refractive index at 20 deg. C.....	1.458 to 1.468
Acid value.....	Up to 2
Ester value.....	6 to 20
Ester value after acetylation.....	30 to 60
Solubility.....	Soluble in 1 to 2 volumes and more of 80 percent alcohol; soluble in 3 to 12 volumes of 70 percent alcohol, sometimes with turbidity.

An Italian oil of *Salvia officinalis* described by Morani[5] showed the following constants:

Specific gravity at 15 deg. C.....	0.91948
Optical rotation...	−11 deg. 38 min. Because of its laevo-rotation, this oil was different from regular Dalmatian sage oils.
Refractive index..	1.4758
Ester content calculated as bornyl acetate..	2.51 percent.
Total alcohol content calculated as borneol.....	130.4 percent.
Solubility.....	Soluble in 9.5 volumes of 80 percent alcohol.

According to the same author,[5] the oil consisted off:

About 15 percent terpenes,
About 31.5 percent ketones (a-thujone and dl-camphor),
About 15 percent cineol,
About 11.2 percent free alcohols (l-borneol and probably dl-borneol),
About 2.3 percent esters,
About 20 percent sesquiterpenes.

Morani,[5] furthermore, showed that the oil exhibits marked differences in composition according to whether it is obtained in spring and summer from the flower heads alone, or from the whole flowering plant, or in winter from the nonflowering plant.

The oils contained:

	Distilled from whole flowering plant in summer (Percent)	Distilled from whole nonflowering, plant in winter (Percent)
Cineol.....	32 to 35	13 to 20
Sesquiterpenes.....	About 30	About 20
Borneol.....	9 to 14	7.5 to 12
Camphor and thujone...	5 to 10	20 to 32
Terpenes.....	?	About 15
Esters.....	2	2.2 to 3.7

If the findings of Morani are correct, the winter oil seems to be of higher quality than the summer oil, thujone being the most important constituent of sage oil, and mainly responsible for its characteristic odor and flavor.

Genuine Dalmatian sage oils of our own importation, which were analyzed in our laboratories during the last seven years, varied between the following constants:

Specific gravity at 15 deg. C.....	0.914 to 0.927
Refractive index at 20 deg. C.....	1.4560 to 1.4680
Optical rotation...	+2 deg. 7 min. to +27 deg. 55 min.
Ketone content calculated as thujone (hydroxylamine method).....	22 to 61.4 percent. The higher the thujone content, the higher the quality of the oil. Good oils should contain 50 percent and more of thujone.
Total alcohol content calculated as borneol.....	7.5 to 16 percent.
Ester content calculated as bornyl acetate.....	1.6 to 6.2 percent. A high ester content is usually connected with a low thujone content.
Solubility at 20 deg C.....	Soluble in 1 to 2 volumes and more of 80 percent alcohol. Several volumes of 70 percent alcohol are required for solution; not always clearly soluble even in 10 volumes of 70 percent alcohol.

Chemical Composition of Dalmatian Sage Oil

The following compounds were, so far, identified in oil of *Salvia officinalis:*

Salvene.....	A hydrocarbon $C_{10}H_{18}$ (boiling point, 142 to 145 deg.; d_{20}deg., 0.800; n_D 1.4438; α_D, + 1 deg. 40 min.) was obtained from the foreruns of sage oil after repeated distillation over metalic Na and called "salvene" by H. Seyler.[6] These first fractions consisted of 1 to 2 percent of the total oil and boiled below 155 deg. Oxidation of salvene with $KMnO_4$ yielded almost quantitatively an acid, probably β-tanaceto ketonic acid (β-thuja ketonic acid) the semicarbazone of which melts at 204 deg. Salvene is probably a dihydrotanacetene.
d-α-pinene.....	Wallach[7] converted the fraction 156 to 158 deg. into dipentene (melting point of tetrabromide 124 to 125 deg.), and the nitrosyl chloride compound of the fraction into nitrosopinene (melting point 130 deg.)[8] identifying thereby the hydrocarbon in question as d-α-pinene. It seems that pinene occurs in sage oils as a mixture of the two optical isomerides, one or the other predominating.
Cineol.....	Identified as HBr compound in the fractions 174 to 178 deg. by Wallach.[9]
d-β-thujone.....	Semicarbazone (melting point 174 deg.), identified by Wallach.[9]
l-α-thujone.....	Semicarbazone (melting point. 186 deg.), identified by Wallach[9] in the fractions 198 to 203 deg. as main constitutents, the oil containing up to 50 percent. The compound $C_{13}H_{18}O$ was originally called salviol by Muir and Sugiura. Semmler[10] thought that it might be identical with thujone or tanacetone. The Schimmel chemists[11] showed that the corresponding compounds isolated with bisulphite from oil of sage, thuja, tansy and wormwood are identical. Wallach[12] obtained the same derivatives from thujone, tanacetone, salviol or absinthol and thereby proved that these compounds are actually identical.
Borneol.....	Acetylizing the fractions 205 to 215 deg., the Schimmel chemists[13] found that they contained about 8 percent of an alcohol possessing the empirical molecular formula $C_{10}H_{18}O$. Treatment with benzoyl chloride and saponification of the benzoic ester yielded a compound resembling borneol, (melting point 204 deg.; α_D, in 10 percent alcoholic solution, + 0 deg. 23 min.)
d-camphor.....	Melting point of oxime 118 deg. Aside from borneol, the Schimmel, chemists[11] later identified d-camphor in the oil obtained by cohobating the distillation waters.

Application of Oil of Sage

Dalmatian oil of sage has come into prominence comparatively recently. Previous to 1914, only a few hundred kilos of oil were produced in Dalmatia and exported mainly to Germany. In the early twenties, however, the United States became interested in the oil which had, over the dried leaf material, the advantages of greater uniformity and easier application. From then on, the exports of oil of sage to the United States reached into thousands of kilos yearly.

The essential oil of *Salvia officinalis* is employed in medicinal preparations as a convulsant, resembling in its action oil of wormwood, but less powerful.

The bulk of oil of sage, however, is

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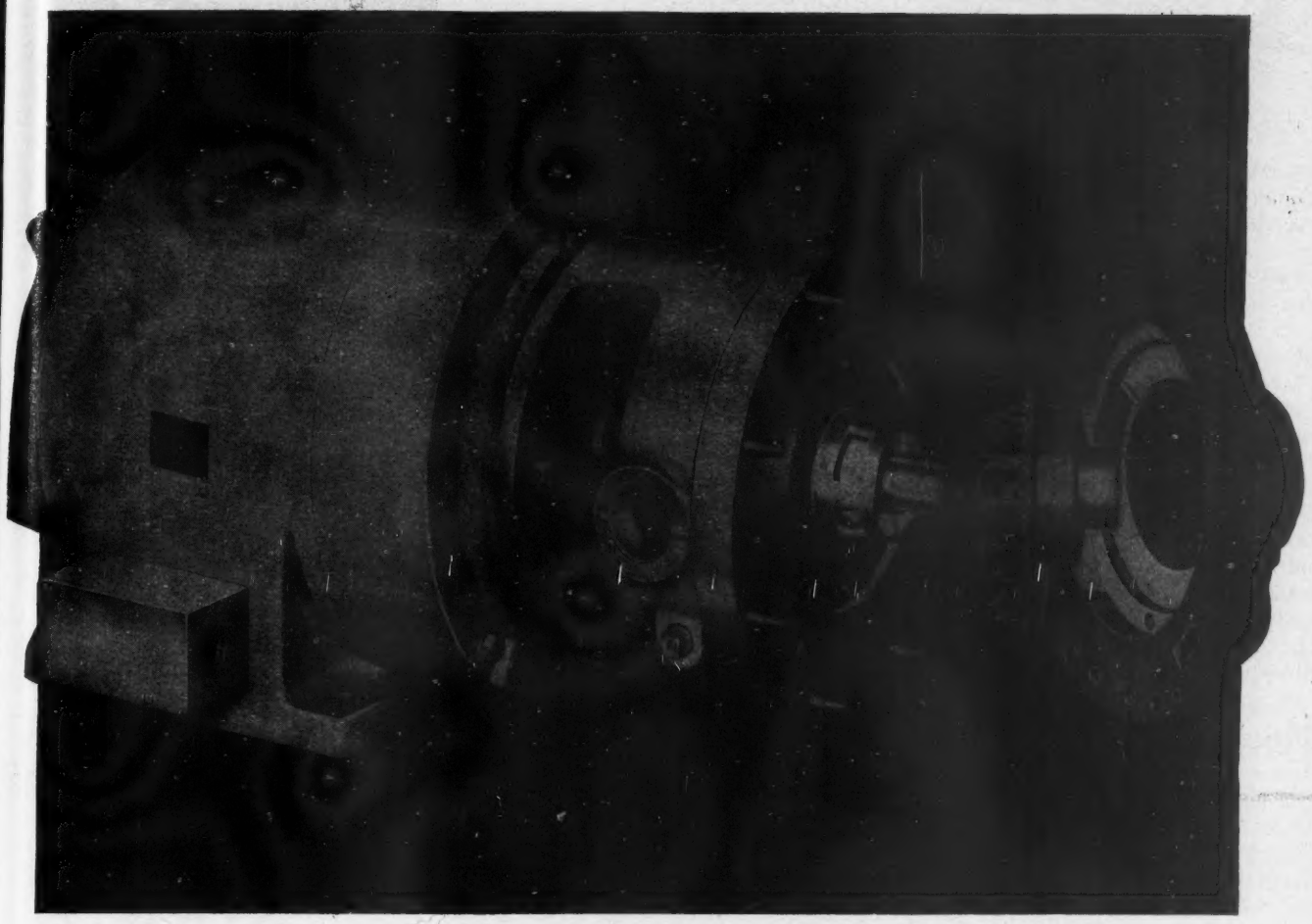
NASH CLEAN-AIR COMPRESSORS

(TRADE MARK REG.)

are Long Life compressors, because they have no internal wearing parts



The Nash Clean-Air Compressor has but one moving part, cast in one piece and rotating in the pump casing without metallic contact. No internal lubrication is necessary; therefore air or other gas compressed with a Nash is entirely free from oil contamination.

Dust and heat are removed from the air, or gas compressed, by the unique Nash "Liquid Piston". Air from a Nash Compressor is therefore delivered free from dust, heat, or oil, without supplementary filters or air washers, in a perfected mechanical structure with no internal wearing parts.

Air or gas from a Nash Compressor may be used for agitating, blending, maintaining pressure on storage tanks, or moving liquids and materials by pressure displacement, in connection with the most delicate food, beverage, or chemical process, without danger of contamination.

Bulletin D-252 tells all about Nash Clean-Air Compressors, and it is free on request.

THE NASH ENGINEERING COMPANY

220 WILSON ROAD, SOUTH NORWALK, CONNECTICUT, U. S. A.

NEW PACKAGES & PRODUCTS

It Won't Melt

ARMY QUARTERMASTER CORPS research laboratories have made surprising progress in developing food products, such as the new canned butter, a special mixture of creamery butter, fresh cheese curd and skim milk powder processed so it can be stored for months without refrigeration.

Continued research on a suitable chocolate candy bar for soldiers in the tropics has resulted in a block-shaped bar which has proven successful in laboratory tests up to 120 deg. F. Chocolate, sugar, skim milk powder, cocoa fat, oat flour, artificial flavoring and vitamin B make up the new 2-oz. tropical bar, developed by the Quartermaster Corps and chocolate companies. The new formula must be pressed into a mold since it cannot be poured.

Rations for Flyers

EMERGENCY RATIONS for Army fliers who fly over water are now packed in a special "Life Raft" ration can made and packed by Continental Can Co. Continental hit upon the plan of cutting down 6-lb. oblong key-opening luncheon meat cans to 3 in. to provide both the space and shape needed. These packages will be rolled up inside the rubber life rafts. The cans are hermetically sealed and completely lacquered on the outside.

Each package of rations consists of 12 packages of "Charms," 6 individual "P-K" packages, and vitamin tablets—enough for five or six men for one day or one man for five or six days. In the development of this ration, dehydrated concentrates, including dehydrated meats and the like, could not be used as they cannot be consumed in any quantity without fresh water. Therefore—the idea of using candy made from sugar and water.

What's In the Lifeboat

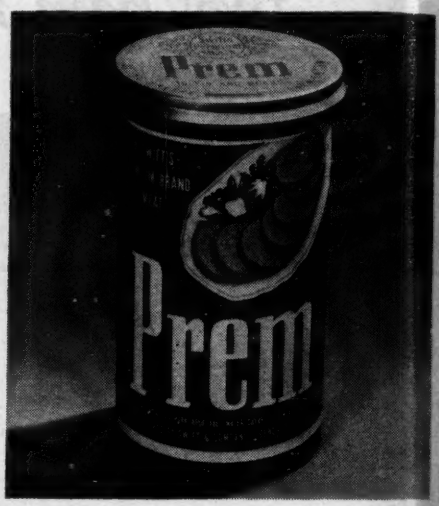
A NEW manner of packaging food and water in hermetically sealed cans, for use in lifeboats, has just been approved by the Commandant of the Coast Guard in connection with the emergency regulations for small vessels. Advantages are: easy stowage under seats and in wing-tanks of lifeboats, with a consequent saving of foot room in the boat, and greater ease in properly apportioning the food and water supplied to a lifeboat of given capacity.

The hermetically sealed water containers hold 1¾ quarts, and six of these constitute the minimum requirements of 10 quarts of water per person. In use, the moderate size of the water containers minimizes contamination or loss from spilling.

The food containers hold 7 oz. each of chocolate, pemmican, malted milk tablets and type C ration biscuits.

"Prem" in Glasspack

"PREM," Swift & Co.'s sugar-cured canned luncheon meat, is now being



packed in a 12-oz. glass-tumbler with a vacuum cap. The three different containers now being manufactured; glass pack and round and oblong tins, make considerably more Prem available to the trade.

Products of the Times

SOYBEANS, the experts say, will form a basic part of our diet by 1944. Profiting by the recent wave of publicity for soya foods are three products of the Vee-Bee Co., Chicago, Ill.: "Soy Krums," soy muffin mix and soybean flour. The Soy Krums, which are used for "breading" either meat or fish, are a 100 percent soybean product. The high-protein muffin mix can also be

YOU CAN GIVE A BOTTLE "CRAMPS"

Yes THERE'S A DIFFERENCE IN GLASS

AN overheated swimmer runs the risk of "cramps" every time he plunges into cold water. Glassware, too, gets "cramps" when subjected to quick temperature changes. Technical men call it "thermal shock." All commercial glassware is subject to it—but some ware resists it better than others.

Resistance to thermal shock is vitally important to those glass users whose processing involves wide temperature differentials. But even if you aren't in that class, the fact that glass varies greatly in its ability to withstand thermal shock is important to you because it proves a point—the point that all glass is *not* the same.

The difference between ordinary glass and top-quality glass does not lie in any single characteristic, but rather in a combination of many things—composition, brilliance, thermal shock resistance, and so on.

On the specific point of thermal shock, we believe you will find Armstrong's Glass somewhat superior. But you'll find our ware even more desirable and trouble-free when you weigh all its points of extra value together. Remember, it is the *combination* of many desirable qualities, some of them small in themselves, that makes fine glassware you can depend upon.

Armstrong's new booklet, "Men and Glass," tells the story of the skill and experience that go into the making of fine glassware. Send for your free copy by writing Armstrong Cork Company, Glass and Closure Div., 4209 Prince St., Lancaster, Pa.

ARMSTRONG'S GLASS

and **ARMSTRONG'S CLOSURES**

ONE PRODUCT SELLS ANOTHER...

when your brand name's on the cap

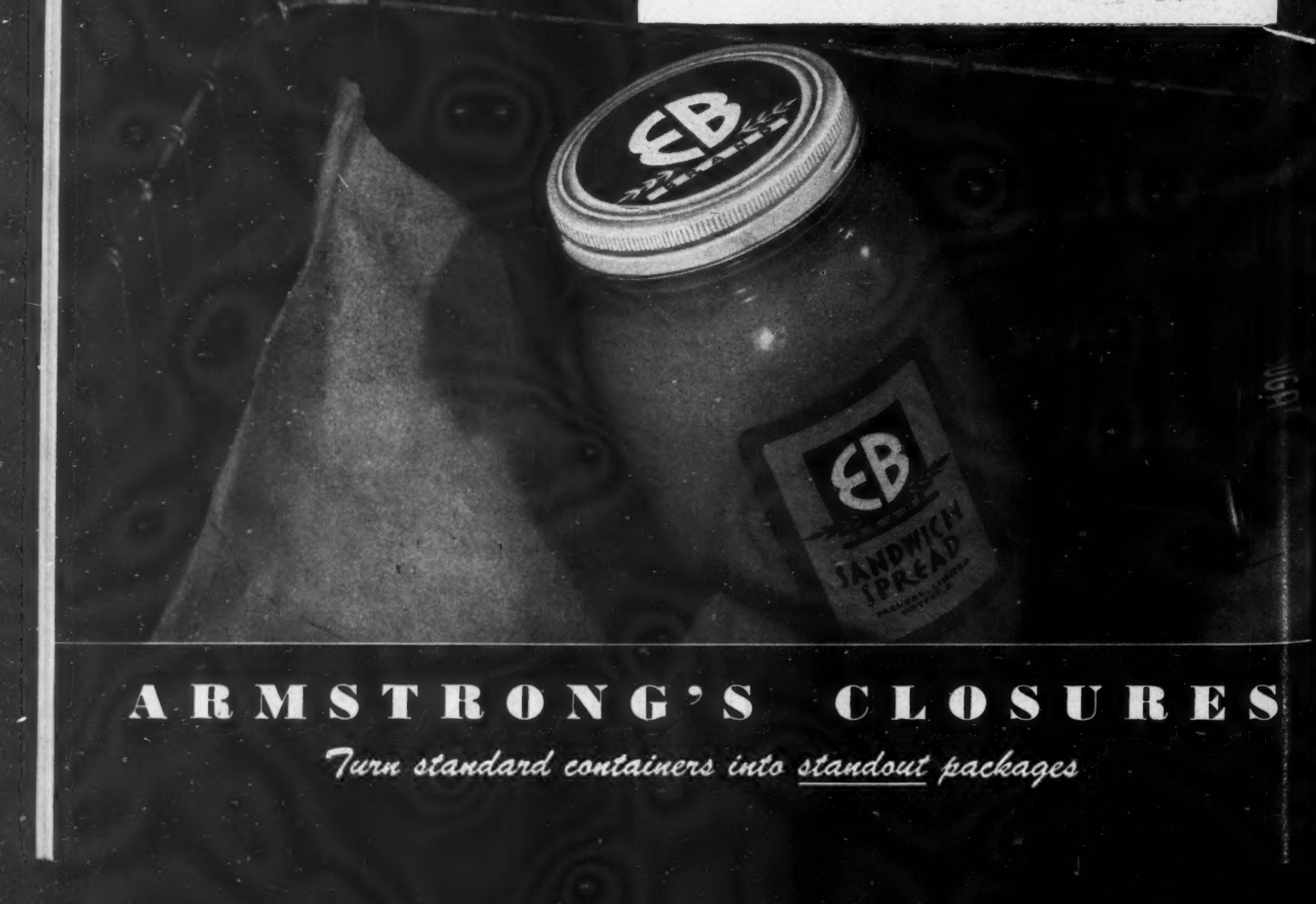
PUTTING your brand name or trade-mark on lithographed Armstrong's Metal Caps makes it easy for housewives to spot your packages quickly. And that means extra sales for your product—extra sales for all your products, if you're packaging a line.

What's more, lithographed Armstrong's Metal Caps keep on selling your brand name in the home. Every time your customer opens your package, she gets a fresh impression of your trade-mark or name. These constant reminders help build recognition for your whole line.

Find out now how economically you can add these "silent salesmen" to all your packages. Send us your present package, and let us show you how effectively it can be improved by a sales-building cap design. No obligation, of course.

And if you have any other wartime glass packaging problems, let us know about them, too. With our years of experience in the closure and container field, we may be able to offer solutions. Armstrong Cork Company, Glass and Closure Division, 4209 Prince Street, Lancaster, Pennsylvania.

The Army-Navy "E" has been awarded to the men and women of Armstrong's Closure and Floor Division Plants for excellence in production of such war materials as cartridge cases, shells, bombs, camouflage, and aircraft parts.



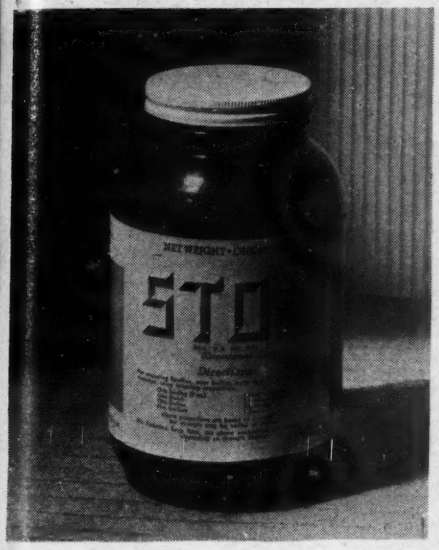
ARMSTRONG'S CLOSURES

Turn standard containers into standout packages

used in making pancakes or waffles; it contains about 60 percent soybean flour, wheat germ, corn germ, flour, bran, calcium acid phosphate and sodium bicarbonate. The mix is about 34 percent protein, suitable for use by many persons whose diet is restricted. Vee-Bee Co.'s soybean flour has established a sound reputation in that field.

Meatless Soup Base

"Strox," a meatless base for making savory bouillon, soups, gravies and sauces has been developed in the laboratories of Standard Brands, Inc., to help housewives cope with the meat shortage.



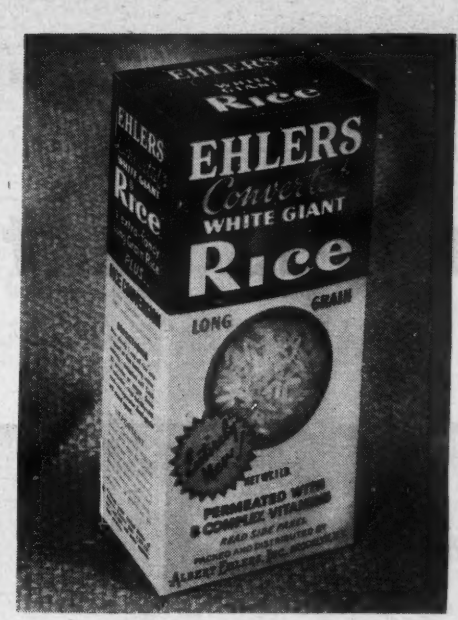
Made from hydrolyzed proteins, yeast-vegetable extract, salt, vegetable fat and spices, the stock is rich in vitamin B_1. One teaspoon per serving is said to supply from a natural source one-fourth of the minimum daily requirements, plus riboflavin and other B vitamins.

Gilding the Lily

Fruit tablets which resemble aspirin are a new preparation designed to be added to cut or sliced apples, bananas, peaches, nectarines, apricots, plums and pears, to help retain the original color of the fruit without changing the flavor. "Frulite," produced by The Frulite Co., Yonkers, N. Y., can be used in treating fruit to be frozen, dried or pulped, or to prepare fruits for use in fruit cups, salads, compotes, baking or canning. The tablets are sealed individually in cellophane.

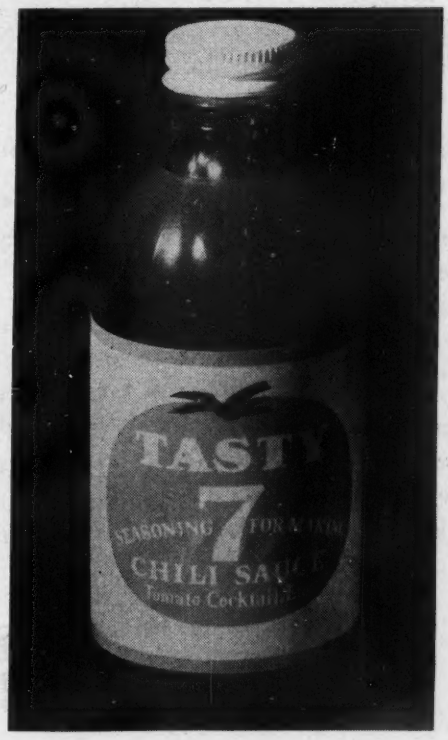
Rice with B Vitamins

Albert Ehlers, Inc., Brooklyn, N. Y., is introducing converted "White Giant" rice permeated with B complex vitamins. The rice is a long-grain variety and the conversion is a new method of processing unmilled rice. By use of vacuum and pressure the grain of rice is permeated with water, carrying the water-soluble B vitamins and other whole-grain properties found in the hulls, bran layer and germ. During the periods of steaming and drying, these properties are heat-sealed into the grain and largely remain there after milling, washing and cooking. Two designs of packages, made by Robert Garr Co., are available.



Aid To Home Canning

At the height of the canning season, Curtice Brothers Co., Rochester, N. Y., introduced a welcome aid to home canners—tomato seasoning for tomato cocktail and chili sauce. "Tasty 7" seasoning is made of seven ingredients, including spices, vinegar, sugar, onion and salt; it is the same liquid used by Curtice Bros. to flavor its own tomato products.



any type of available paper package

for every type of food

We have them all . . . cellophane; glassines, opaque to super transparent; papers . . . in all types of laminations and combinations . . . with and without heat-sealing features and thermoplastic coatings . . . bags, envelopes, sheets, with and without cartons . . . for packaging to government specifications or for essential civilian uses.

Describe your packaging need, and we'll send samples of *all* packagings suited to your purpose. Mention quantity used and we can quote prices, too. And, if you're developing a new package, we'll be glad to test or help you test and compare materials. (No obligation —for any service.)

P. S. PACKERS OF DEHYDRATED FOODS will find here every known type of paper packaging for dehydrated foods . . . each carefully tested and proved equal to, or superior to any other leading packages. Consequently, consultation with us is quick way to compare the merits of all the best dehydrated foods packagings on the market . . . will save you much "shopping" time. And, you are assured of unbiased recommendations and our wholehearted, friendly cooperation in determining the best package for your product and purse.

"Specialist in Special-Purpose Paper Packagings" . . .

Packaging Division
E. W. TWITCHELL Inc.
777 Public Ledger Bldg., Philadelphia 6, Pa.

CROWN *is in this picture* TWICE

No, none of the more familiar Crown products of peacetime are on view!

But the canisters that hold the filter elements for those gas masks are a Crown wartime product . . . produced by the million in the Crown plant to safeguard military, naval and civilian users.

And those waterproof metal ammunition boxes are another Crown product . . . another example of the way all of Crown's facilities have been enlisted in the service of a nation at war!

Meanwhile . . . the less dramatic but no less necessary products . . . cans in which to pack food for fighting men and for the home front . . . cans for the essential products which can not be successfully packed in other ways . . . continue to roll from Crown's production lines! Crown is doing double duty these days!

CROWN CAN COMPANY, New York • Philadelphia. *Division of Crown Cork and Seal Company,* Baltimore, Md.

★ ★ ★ ★ ★

CROWN CAN

FOOD INDUSTRY NEWS

Bread Standards Announced After Two Years' Wait

Tentative standards of identity take into account the practical working needs of bakers

STANDARDS of identity for various kinds of bread were promulgated in tentative form by a proposed order of the Food and Drug Administration published August 3. This is a culmination of hearings and informal discussions that have extended over more than two years. The proposed standards were subject to criticism by briefs from the industry or other interested parties up to August 23. The final order taking account of briefs which may have been filed by that date is expected during September, or soon thereafter. The standards will then take effect 90 days after formal promulgation.

The baking industry is well pleased with the provisional order because it takes account of the practical working needs of the bakers. However, a brief commenting on a limited number of points was filed by American Bakers Association requesting minor amendments for still more effective working under the standards.

Notable among the industry comments was one requesting freedom from the requirement of label declaration when certain protective agents are added, such as calcium propionate or sodium propionate. The industry points out that the use of these optional ingredients is intermittent and that it would be difficult to operate under the proposed standard without having two different sets of labels, one of which would be used when these ingredients are "added to retard spoilage" and the other set to be used when these chemicals are absent.

The soybean industry is also asking that a more generous ruling be adopted with respect to soya flour. It is thought that perhaps F&DA will suspend the effect of the paragraph limiting that ingredient so that further evidence may be added to the record. At the time the original record was made in 1941 there was relatively little interest in and very little evidence presented for the use of soya flour. Now conditions are different and the industry hopes for some amendment before the final standard is enforced in this particular.

SAILORS SERVE ON FOOD FRONT

As spoilage of hundreds of tons of tomatoes that ripened ten days ahead of schedule threatened New Jersey's bumper crop, the War Manpower Commission appealed to the armed service for volunteers to help in canning operations. Sailors from the Philadelphia Navy Yard, who volunteered for spare-time work to handle the crop, are shown working on the production line in a Camden cannery.

Announce Soya Product Allocations for Year

MORE THAN 12 times the quantity of soya products available last year have been allocated to civilians for a year's period ending June 30, 1944, according to a recent WFA announcement. While the bulk of the supply will be used for war purposes overseas, particularly for meeting the critical nutritional needs of countries liberated or expected to be liberated by the Allies, the tremendous expansion in production will permit U. S. civilians to use large quantities of these high-protein products. To strengthen U. S. wartime diets nutritionally, civilians have been allocated 27 out of every 100 lb. of soybean flour, flakes and grits produced, or 362,500,000 lb.—a decided increase over the estimated 30 million pounds used domestically last year. Allocations by quarters contemplate that the use of soya products during the first quarter, ending September 30, will be relatively small as compared with each of the succeeding three quarters.

Cold Storage Restricted

USE of cold storage space has been limited to food that must be kept at low temperatures. Products that can be kept in dry warehouse space must not be accepted by cold storage warehouses. These foods, which are listed in FDO No. 70, are canned or bottled foods or drinks that the trade likes to keep in refrigerated space rather than products that will spoil if not kept cold. The order provided that they should be moved out of cold storage space at the expiration of the current storage month. Advance space reservations were also restricted to prevent facilities from lying idle because of future commitments.

Grade Labeling Still Confused

OES orders grade labeling of meats; requirements dropped on some foods

WASHINGTON is wondering how to interpret conflicting orders that came out simultaneously on August 5.

On that day grade labeling requirements on certain types of packed foods, peanuts and dry edible beans were eliminated by OPA to conform with the Taft amendment to the Emergency Price Control Act. On the same day the Office of Economic Stabilization issued Regulation No. 1 requiring the grading and grade labeling of meat.

The legal reasoning by which OES justified the order which seems to be in direct conflict with the meaning and intent of the Taft amendment was given in the official press release as follows:

"OES pointed out that the requirements for Federal grading and grade marking had been recommended to OPA by the industry itself and welcomed by the industry during the nine months they have been in effect under OPA regulations. The Taft Amendment to the Emergency Price Control Act of 1942 deprived OPA of its power to require the grade marking of meats. This amendment was passed as a part of the Commodity Credit Corporation Appropriations Act of 1943. By its terms and as explained on the floor of the Senate the amendment was only a limitation on the power of OPA. Unaffected was the power earlier granted by Congress in the act of October 2, 1942, authorizing the issuance of regulations by the President to accomplish the stabilization of prices affecting the cost of living. By executive orders that authority and responsibility for its exercise has been delegated to the Director of Economic Stabilization."

Rubber Still Allocated Despite Revised M-104

ANNOUNCEMENT that food processors may use rubber without restriction as a sealing medium for closures for glass containers is not of great importance to the industry. The amendment to Conservation Order M-104 from which the limitations on the use of rubber, both synthetic and natural, was deleted, indicates the condition of the rubber supply. Rubber continues to be allocated to the closure manufacturer, which limits the food processor to the extent that the closure manufacturer is limited.

If the closure can be purchased it can be used within the quotas listed in the order.

Processors are still confined to the permitted products, materials and quotas shown in M-104.

DEHYDRATOR GETS "E" AWARD

The first Army-Navy "E" award to go to any firm engaged exclusively in food dehydration has been given to the C. B. Gentry Co. plant in Gilroy, Calif. Gentry has been engaged in dehydrating onion and garlic products for nearly ten years. Shown above with the "E" pennant are (left to right) Col. Arthur W. Stanley, director of procurement for the California Quartermaster Depot; George E. Clausen, president of Gentry; Lloyd C. Bellisime of Gentry; and Lieutenant Commander Allan R. Bosworth, United States Navy.

Ads To Inform Public on Food

Campaign sponsored by industry on behalf of WFA is scheduled to start in September

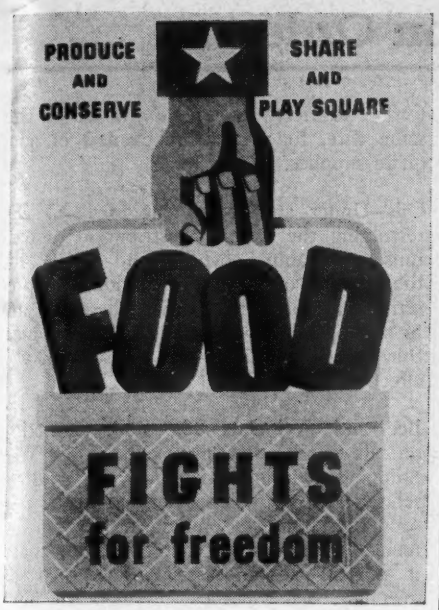
AN ADVERTISING CAMPAIGN sponsored by food processors and distributors in behalf of the War Food Administration to make the civilian public aware of the magnitude and gravity of the food situation facing the United States is scheduled to break in late September and reach a peak in early winter. The campaign is expected to secure the cooperation of the public and correct misinformation or lack of information about domestic food supplies, such as the belief that civilians are allowed only what is left over after Lend-Lease and the armed forces get theirs. To ensure that sufficient food is available to use as a weapon of war, the wastage of food must be reduced to a minimum and public food habits may have to be changed quickly.

As explained by Vernon Beatty, advertising manager of Swift and Co., who is serving as advertising director of WFA, and Charles Mortimer, advertising manager of General Foods, who is serving as chief coordinator of the War Advertising Council, the job is to get the people of the United States to help themselves. A slogan, "Food Fights for Freedom," is to be supplemented by the secondary slogans, "Produce and Conserve," "Share and Play Square." The public is to be conditioned not only to get along on 75 percent of the domestic production, but to accept sudden changes in the character of available food supplies as necessitated by the fortunes of war.

Copy suggestions will be sent to all food processors and distributors who will cooperate as soon as the campaign breaks. Every known means of educating the public is to be utilized in an effort to boost the food reserves for war as quickly as possible. Business periodicals in the food field will carry full information in their October issues.

WFA Asks Expansion Of Preserve Industry

WFA wants more jam. To swell the 1943–1944 supply of bread spreads for domestic consumption, that government agency has urged manufacturers of preserves to expand production of jam, jelly, marmalade and fruit butter. The action is part of a program designed to make possible increased consumption of the more plentiful foods, particularly cereal products, through the most stra-



WARTIME FOOD SYMBOL

The "food basket" symbol and the slogans "Produce and Conserve" and "Share and Play Square" will be used as part of the advertising campaign which will sell to the people the importance of cooperating in the wartime food program.

tegic utilization of less abundant foods, such as fruit and sugar. OPA has increased ration allowances of sugar to commercial producers of preserves to facilitate the production of 500,000,000 lb. of jams, jellies and other types of preserves, as called for by WFA. This represents an increase of about 200,000,000 lb. over last year's supply for civilians.

Technologists Oppose Kilgore-Patman Bill

IN A RESOLUTION endorsed by its executive committee, American Association of Cereal Chemists urges all cereal chemists to communicate to their Congressmen their objections to the Kilgore-Patman Bill S–702, HR 2100. This bill calls for the establishment of an Office of Scientific and Technical Mobilization.

This action was taken because the executive committee believes that the establishment of such an office would confuse the war effort and might develop in peacetime into a bureaucracy that would impede scientific and technical progress. The committee is also of the opinion that this proposed legislation would disturb the cooperation now existing among scientific men in the cereal industries in their joint efforts to aid in the war effort.

The executive committee represents an association which includes in its membership chemists from most of the cereal laboratories of the United States.

Wrapping Machine Versatility

A big advantage in WAR wrapping

War presents its problems with extreme suddenness—and in a multiplicity of forms . . . This is especially true of war-time packaging. Sizes have to be changed . . . New types of products must be turned out . . . Volume suddenly expands . . . And new wrapping materials frequently have to be used.

Only the most versatile type of machine can meet these conditions satisfactorily, as many a manufacturer has discovered.

Our FA model, illustrated above, is an outstanding example of what we mean by versatility . . . The packages shown contain different types of gauze bandage made by the Millburn Mills, recent purchasers of this machine. The smallest package measures 3" x 1⅝" x ½" and the largest one 9" x 4¼" x 2 5/16", which gives you some idea of the extremely wide range of sizes that can be accommodated on this machine. But this is only one advantage offered. The machine can readily be adapted to any type of wrapping material, as well as to various forms of sealing, whether by heat or adhesive. And it can handle the most difficult types of products—from a soft, flexible pad of bandage to a carbine clip with irregular shaped ends.

This is no sudden war-time development. We appreciated the advantage of flexibility years ago —and built all of our machines with it in mind.

Military supplies wrapped by our machines

PACKAGE MACHINERY COMPANY
Springfield 7, Massachusetts
NEW YORK • CHICAGO • CLEVELAND • LOS ANGELES
TORONTO

Mexico: Agencia Comercial Anahuac, Apartado 2303, Mexico, D. F.
Argentina: David H. Orton, Maipu 231, Buenos Aires
England: Baker Perkins, Ltd. . . Peterborough
Australia: Baker Perkins, Pty., Ltd. . Melbourne

PACKAGE MACHINERY COMPANY
Over a Quarter Billion Packages per day are wrapped on our Machines

The PINK CORN WORM

Beau Brummell of the insect world, the Pink Corn Worm changes garb at every stage of his unworthy existence. For egg, he dons a pearly white; for larva, sports a pink costume, with head and shoulders brown. Then he burrows into a kernal of grain or corn to await still more raiment. Eventually emerges winged in yellow, reddish brown and black.

FUMIGATE

Properly applied HCN gas is an effective fumigant for control of this and other insect and animal pests. Call on your local Pest Control Operator for a well planned fumigation program.

We have a book containing interesting information about pests and their control by fumigation. Just drop us a line on your letterhead and we will be glad to send you a copy. E. I. du Pont de Nemours & Co. (Inc.), Electrochemicals Department, Wilmington, Delaware.

DU PONT
REG. U. S. PAT. OFF.
CYANEGG
REG. U. S. PAT. OFF.
AN ECONOMICAL SOURCE
OF HCN FUMIGATING GAS

W. P. O. No. 1627

Food Administration Orders

Sugar—WFA amended FDO 7 and 7.1 on July 29. The amendment to FDO 7 limits purchases, importations or acceptances of delivery of raw sugar to refiners and to governmental agencies authorized by the Director of Food Distribution. The amendment to FDO 7.1 establishes raw sugar allotments for refiners in continental United States for the period January 1, 1942, to September 30, 1944.

Beef Supply—On July 28 WFA announced that the amount of beef which slaughterers operating under Federal inspection are required to set aside was reduced from 45 to 30 percent of their weekly production for one week, and to 40 percent for future weeks. The amendment to FDO 28.2 applies only to weekly production of steer and heifer beef which meets Army specifications. The 40 percent level represents about 18 percent of the total commercial beef production.

Salted Fish—To assure equitable distribution in the United States of limited supplies of seven species of imported salted fish, WFA on August 5 established individual quotas for each importer, based on the quantity which he brought into this country in 1942. According to the amendment to FDO 72, each importer's share of the 1943 imports of salted cod, haddock, hake, cusk, ling and saithe will be limited to 55 percent of the quantity which he imported from Canada and Newfoundland, respectively, in 1942 and to 20 percent of his 1942 imports from Iceland.

Peaches—Under FDO 73 issued August 6, interstate shipments of some varieties of California freestone peaches are being stopped to permit dryers and processors to buy sufficient quantities of this year's crop to meet military and civilian requirements for dried peaches. Interstate shipments of Elberta peaches from Oregon and Washington are restricted in FDO 74, issued on the same date, to help assure canners of adequate supplies.

Oils—Under an amendment to FDO 29, restricting the use and distribution of cottonseed, peanut, soybean and corn oils, the Director of Food Distribution may prescribe the point from which these oils are to be shipped as well as the point at which they must be received. The amendment was effective August 7.

Beef and Veal Cuts—The quota restriction on sale of fabricated meat cuts to the War Shipping Administration and to contract schools feeding members of the armed personnel was removed on August 7 by amendment 4 to Rev. MPR 169. The action made it possible for hotel supply houses to sell beef and veal carcasses and wholesale cuts without affecting their status as defined in the regulation.

Dried Fruit—Dried fruit packers must set aside for government procurement their entire holdings and acquisitions of seven fruits during the 1943-1944 season under a continuation of last year's program, through extension of FDO 16, amended to include dried currants and tighten other provisions. According to the action announced on August 10, civilian supplies will be provided this year, as last, through the release of quantities into regular trade channels.

Alcohol From Fruits—The manufacture of alcoholic products from 25 varieties of fruits and berries will be restricted beginning July 28—in a step to meet military and civilian requirements for fresh, dried and processed fruits and berries, WFA announced on July 27. The restrictions are contained in FDO 69.

Malt—The original WPB malt order was transferred to FDO, effective July 28, re-

"Somebody turned steam into the refrigerator pipes."

quiring brewers to use 15 percent of their allocated malt grain for producing beer of an alcoholic content of 3.2 percent or less. All 3.2 percent beer in the hands of brewers—up to 15 percent of total plant capacity—may not be sold without authorization from the Director of Food Distribution.

Canned Food—The WFA recently issued an amendment to FDO 22.4 containing reduced set-aside percentages for eight canned fruits and vegetables that canners are required to set aside from their 1943 production to meet government requirements. Under the amendment to FDO 22.4 set-aside percentages were reduced on canned apples, fruit cocktail, beets, sweet corn, pumpkin or squash, lima beans and tomato puree. Applesauce is excluded from the order.

Malted Grains and Malt Sirups—A shortage in the supply of malted grains and malt sirups resulted in FDO 66, issued July 28. No brewer may now use, in the manufacture of malt beverages during any quota period, more than 93 percent of the quantity of malted grain, nor more than 93 percent of the quantity of malt sirup, which he used for such purpose during the corresponding period in the base year.

Develops New Foods From Sweet Potatoes

More than 20 new foods made from sweet potatoes were seen and sampled by the 100 people who attended the conference on prepared sweet potato products held at Alabama Polytechnic Institute, Auburn, Ala., on August 10. These products included different forms of breakfast foods, natural confections, candies, cookies and miscellaneous products.

Fully prepared and ready to serve, the products were developed by the Alabama Agricultural Experiment Station, and they are said to represent an entirely different class of food products. They are made by a cooking-extruding-finish drying process rather than the usual dehydration operation. This process is reported to give a finished product containing only 2½ to 4 percent of moisture and ready to use without cooking or rehydration. Carbohydrate constitutes about 80 to 85 percent of the total content of the products, and over half of this is sugar. The products contain rather large quantities of carotene and some vitamin C. By mixing the sweet potatoes with other ingredients, additional food values can be obtained.

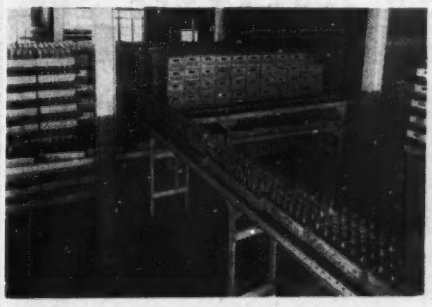
To Build Pilot Plant

The process for making the new sweet potato products has been developed to the point where Alabama Polytechnic Institute is planning to build a small pilot plant to work out on a small scale basic methods and equipment suited to large-scale production.

Your Share OF THE 125 MILLION TONS

Strietman Biscuit Company's new streamline plant is completely equipped with Lamson conveyors.

Atlantic & Pacific Tea Co. Warehouse, showing unique method of hauling trucks by Lamson Overhead Conveyors for faster storage, and speedier assembly of orders.



Empty as well as filled cases move by gravity about this modern Coca-Cola Plant—equipped with Lamson Gravity Conveyors.

★ This year, and for many years to come, America must produce 250 billion pounds of food — a stupendous job of processing, packaging, storing, shipping.

★ To help you handle your share more efficiently, more economically, Lamson offers a complete line of gravity, overhead, live roll, slat, and booster conveyors. Lamson conveyors multiply the productivity of your labor force, increase the usefulness of available floor space, eliminate unproductive handling, and provide better control of goods on hand.

Write for pamphlets showing Lamson conveyors at work. Or, if you have a specific problem, let our engineers help. Wire or write

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Dept. FI Syracuse, N. Y.

Makers of CONVEYORS and PNEUMATIC DISPATCH TUBES

WFA Issues Plan To License Meat

Slaughterers divided into three classes to facilitate meat distribution

To SPEED meat distribution a new overall program of licensing livestock slaughterers went into effect August 15. The plan superseded existing FDO orders but continued their major provisions, including the present quota system regulating deliveries of meat to civilians. Officials pointed out that the present individual quotas will remain in effect until authorities have reviewed them thoroughly. Major regulations setting up the program are contained in FDO 75, which divides slaughterers into three main classes.

Class 1 includes those who slaughter under Federal inspection. Class 2 includes those not under Federal inspection except farm slaughterers, who will be identified as Class 3 slaughterers. Purchases of meat by the Federal procurement agencies will be limited to Class 1 slaughterers. Those slaughterers in Class 2 may secure Class 1 licenses by obtaining Federal inspection.

Purpose of the new licensing program is to simplify and speed up the operation of the meat program necessary for successful prosecution of the war. Jurisdiction over most commercial slaughterers licensed under the new order will be transferred to the FDA regional office of that territory in which the slaughterer is located and delivers meat. One phase of the program will provide an opportunity for slaughtering establishments not now under Federal inspection to increase their slaughter. Arrangements have been made to permit the extension of Federal meat inspection to plants which may qualify for such inspection and sell chilled or fresh frozen meat.

Corn Purchase Announced

ACCORDING to a recent WFA announcement, more than 9,000,000 bu. of corn has been purchased since July 1. A government survey of six important corn states showed that as of July 24 an estimated 9,108,426 bu. of corn had been purchased and an estimated 5,198,342 bu. of that total had been shipped. State estimates of purchases and shipments, respectively, are: Iowa, 6,131,683 bu. and 3,619,869 bu.; Illinois, 1,501,373 bu. and 924,997 bu.; Minnesota, 655,000 bu. and 285,000 bu.; South Dakota, 243,198 bu. and 131,670 bu.; Nebraska, 465,463 bu. and 207,616 bu. and Indiana, 91,709 bu. and 29,190 bu.

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Enriched Flour Rules Expected

Some time in September the WFA probably will issue orders requiring flour fortification

ENRICHMENT of flour, to ensure enriched bread for all the population, will probably be required by Food Distribution orders some time in September. Communications on this subject were received by War Food Administration until approximately the middle of August and the plans for a workable order have been under study since then.

Very general support has been accorded the idea that, especially in wartime, all bread eaten should be enriched. Commercially baked bread has been so prepared for months past. It is expected that flour for household use will be enriched in order that home baked bread may join in supporting a better diet nationally.

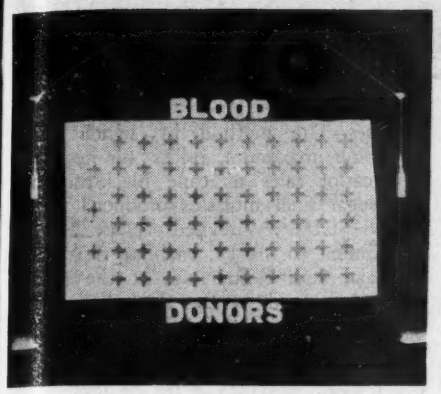
The War Food Administration has found one major problem to solve. This has to do with the way in which flour marketing should be restricted to ensure enriched bread with a minimum burden on industry and a minimum of new cost to the public. When the order is established it may well make some exceptions to the requirement that all flour be enriched at the point of production, because enrichment by the baker or enrichment by the blender of phosphated or brominated flour may achieve the result desired with a minimum of cost and difficulty.

When the new order is issued its effective date will be selected suitably to permit preparation for compliance by all of the varied factors of the food industries who may be affected.

Corn Sirup Permitted In Condensed Milk

SWEETENED CONDENSED milk standards are to be revised by the Food and Drug Administration in accordance with the proposed order published August 13. This will permit the use of corn sirup or corn sugar as sweeteners if desired. There is no restriction on the quantity of corn sirup that may be used as a replacement for sugar or dextrose. But the name of the product resulting will be "corn sirup condensed milk" or "——% corn sirup solids ——% sugar condensed milk" according to the amount of corn sweetener used.

The condensed milk manufacturers have intended products of this character primarily for industrial use, in confectionery, baked goods, and so forth. Hence, these odd names which must be on labels will not be a trade handi-



DISPLAYS BLOOD DONOR FLAG

One of the new blood donor flags sponsored by the Red Cross, displayed by E. F. Kemp, Inc., producers of salted nut products, in Somerville, Mass. The blood donor flag is used to enlist further local contributions to the blood bank, and give recognition to those who have given their blood to save lives at the front.

cap, it is expected. But some of the industry are reported as not too happy about the strange names because they had hoped to develop also household distribution, and this form of labeling is thought to be a handicap for that purpose.

The proposed order permits filing of exceptions up to September 2. Shortly thereafter a revised order is likely to be drafted and the effective date of the modified standard will be 90 days after the date of publication of the final standard.

Makes Meat From Yeast

SYNTHETIC meat, resembling beef but containing more vitamins and proteins, has been developed in the laboratories of Anheuser-Busch, Inc., St. Louis. The "meat" is really a new type of yeast. To produce it, 125 lb. of the yeast is mixed with 7,000 gal. of water, 3,000 lb. of molasses and some ammonia. After 12 hours of agitation by air, the yeast multiplies 16 times in volume, leaving a ton of brown powder ready for use as "meat" or meat extender.

ODT Limits Wholesale Meat Deliveries

IN LINE with conservation of motor equipment, ODT recently prohibited any motor carrier from making more than five wholesale deliveries of fresh or frozen meat, poultry or eggs, or more than two wholesale deliveries of cured, smoked, cooked or processed meat, from one point of origin to one point of destination in any calendar week. General Order ODT 17 as amended directs every motor carrier to establish specific delivery areas or routes.

Have You Forgotten Something?

• Unlike this absent-minded gentleman, people who "clean up" in food industries don't forget. They know that merely cleaning equipment used in food processing, dehydrating, de-bulking isn't enough in today's vast canneries, storage and packing plants.

There's *another* vital need—a germicidal and deodorizing rinse or spray, administered *after* cleaning. And Wyandotte has the answer—in *Steri-Chlor!* Not a cleaner, this dry powder, used in solution, destroys bacteria, erases lingering odors, pays dividends in sanitation insurance.

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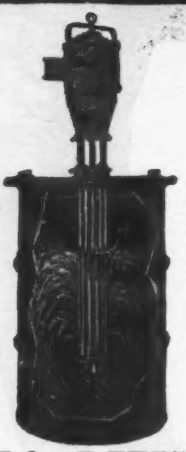

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OPA Price Regulations

Cheddar Cheese—A sliding scale of maximum prices for the "flat" style of Cheddar cheese to be sold to government procurement agencies and to cheese and other food processors was established on July 29 in amendment 19 to MPR 289. These prices vary according to the moisture content of the "flats." OPA also provided markups to be applied by cheese wholesalers on sales and deliveries of natural or processed Cheddar cheese in less than carload lots to Army and Navy establishments.

Domestic Wines—Taking another step in advancing the program relating to the control of prices of alcoholic beverages, OPA on August 5 issued an amendment to Rev. SR 14 with a price-reporting requirement covering all domestic wines. Brand owners had 30 days within which to file the required information on all brands sold in March, 1942. Brands first sold since March, 1942, were to be reported with additional information showing how they were priced. The complete reports will enable OPA to order the repricing of any items which have been improperly priced.

Pork Sausage—When pork sausage is sold at wholesale in sheep casings and is packaged in 1-lb. wax paper cartons, the seller may add $1.00 per hundredweight to the maximum wholesale price for it, according to an amendment to MPR 389 issued August 4. No change is made in the retail price which is under the GMPR.

Specialty Products—OPA on July 30 revised the method by which producers of certain food and beverage specialty products must adjust downward their maximum prices when they enjoy savings because of a change of formula from the original formula used to produce the same commodity on which a maximum price has been established under GMPR. Previously OPA had required that maximum selling prices must be reduced when a formula change results in savings on beverage mix preparations, dehydrated soup mixes, freezing mix preparations, ice cream powders and starch dessert preparations amounting to one-half cent or more.

Frankfurters—A premium of an additional 50 cents per hundred pounds at wholesale of frankfurters or bologna meeting the requirements for Grade AA and made entirely of skeletal meat, containing no extender, was granted to manufacturers of these products in an amendment to MPR 389 effective August 9.

Lamb and Mutton—Following up similar action taken last month on beef and veal, OPA on August 7 reduced the discount on carload sales of lamb and mutton and eliminated the wholesalers' quantity discount. The carload discount is reduced from 75 cents per hundredweight to 25 cents, and the wholesaler is now permitted to charge 75 cents per hundredweight over the applicable price zone, according to the amendment to MPR 239.

Molasses—The method by which sellers determine maximum prices for less-than-tank carlot sales of cane blackstrap and beet sugar final molasses produced in the United States was revised August 2 in an amendment to SR 14, enabling distributors to make tank carlot sales at the March, 1942, price and, at the same time, make less-than-tank carlot sales under the specific schedule in SR 14.

Fluid Milk—Purchasers of milk from producers for resale as fluid milk cannot pay to new producers more than the maximum prices received by those producers during January, 1943. The action, designed to prevent one purchaser from taking producers from other purchasers at a higher price, was taken through an amendment to MPR 329, effective July 31.

Fruits and Berries—Formulas by which canners will establish their maximum prices for their 1943 packs of seven fruits, eleven berries, fruit cocktail and the juices and nectars of the fruits and berries were announced on July 30 in an amendment to MPR 306. At the same time OPA made public the table of specific maximum prices for canners for the 1943 pack of red sour cherries, in dollars-and-cents per dozens cans on a regional basis. The formulas takes account of added raw-ingredient costs, and, in certain states, of added labor costs.

Frozen Fruits, Vegetables—Maximum prices which processors may charge for a number of frozen fruits and vegetables in the 1943 pack were established on August 9 in an amendment to MPR 409. Certain minor vegetables are allowed a 20 percent addition over the 1942 cost of raw materials, based on recommendations of the WFA. A second group of frozen vegetables may be sold at higher prices, the rise being governed by support prices set by WFA. Frozen mixed fruits and vegetables will be permitted to reflect the increased cost of component parts of raw materials. The higher prices permitted for these frozen fruits and vegetables will be passed on to consumers.

Sugar Allotments—A flat percentage increase in sugar allotments to all industrial users, raising allotments to 80 percent of 1941 use, was announced on August 9. This is an increase from present 70 percent levels, and is one of a number of adjustments in the industrial use of sugar. The increase, taken in four amendments to Ration Order 3, was retroactive to August 1.

Malt—Reflecting substantial increases in production costs during the past 15 months, OPA on August 11 raised the maximum price of enzymatically-treated sirups manufactured from cereals and converted by the use of malt for use in the domestic malt brewing industry to $6.45 per hundredweight, f.o.b. plant, for shipments of 15 bbl. or more. The amendment to Rev. SR 14, effective August 17, also fixed a price of $6.50 per hundredweight f.o.b. plant for shipment of less than 15 bu.

Bakery Products—The method by which bakers and distributors establish their maximum prices for fruitcake was revised on July 27 to bring it into line with that used on pricing all baked products except bread, biscuits, crackers and cookies. The action was taken in an amendment to MPR 319.

Grade Labeling of Eggs—All grade-labeling requirements in the regulation controlling prices of eggs were removed on August 14 by OPA to bring that regulation into line with the provisions of the Taft Amendment to the Emergency Price Control Act of 1942. (The Taft Amendment prohibits OPA from requiring grade labeling.) The amendment to MPR 333 requires that sellers will give the purchaser a statement setting forth the grades of all eggs sold.

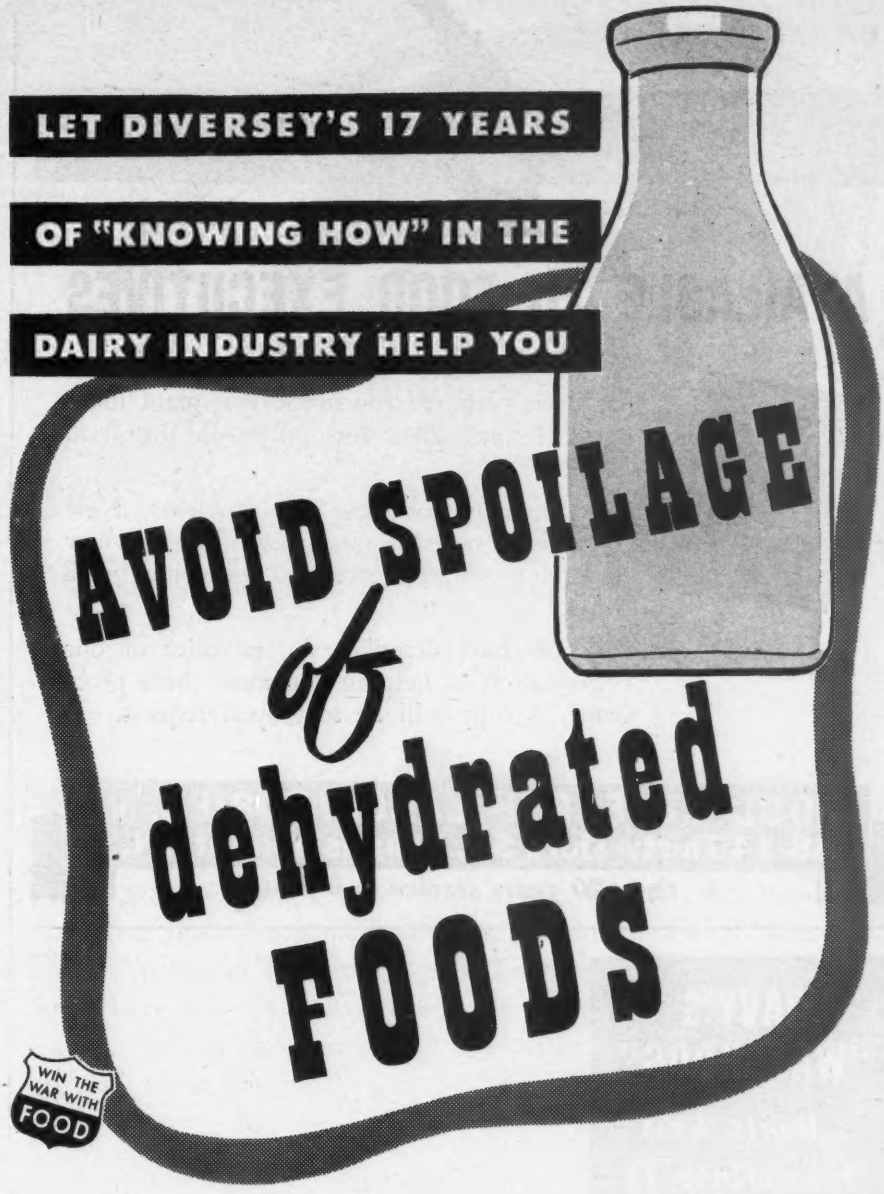
Canned Asparagus—A method by which canners can compute maximum prices for sales of any variety, style, grade or size of canned asparagus, packed in tin, not already covered by the existing provisions of the canned vegetable regulation, was announced on July 27 in an amendment to MPR 306. Processors in California, Oregon and Washington may adjust their 1942 prices by adding 1½ cents per pound to the 1942 raw cost of asparagus, as they were required to compute it.

Fresh Pork—Additions to the maximum price for fresh pork that may be made when it is frozen for sale to war procurement agencies were announced on July 30 in an amendment to MPR 148. The additions are intended to compensate sellers for the extra cost of handling and holding in such sales, and to minimize the preference of packers for selling pork fresh in the civilian market.

Malted Milk Preparations—Wholesale and retail sales of malted milk preparations containing 35 percent or more malted milk were returned on August 6 to coverage under MPR 280. Preparations containing more than 35 percent malted milk were taken from the new regulations and restored to the earlier regulation which had as a base pricing period of September 28 to October 2, 1942.

Fats and Oils—The revised price schedule which has controlled dealings in fats and oils has been rearranged and codified into a maximum price regulation, with a few minor exceptions. According to the terms of MPR 53, issued August 9, sales of fats and oils products in the finished form, sales of refined fats and oils (except coconut oil) destined for use or consumption without further processing or packing by the buyer, and sales of lard destined for human consumption without further processing are exempt from the operation of the order, unless a maximum price for such fats or oils product is enumerated in terms of dollars and cents, or a method for computing a maximum price for such fats or oils is set forth in the regulation.

Beer, Ale Prices—Brewers of beer and ale who bring new brands onto the market must now establish maximum prices for them in line with their own most similar product, according to an amendment to MPR-259, effective August 9.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Put your sanitation problems in the capable hands of a trained expert . . . the

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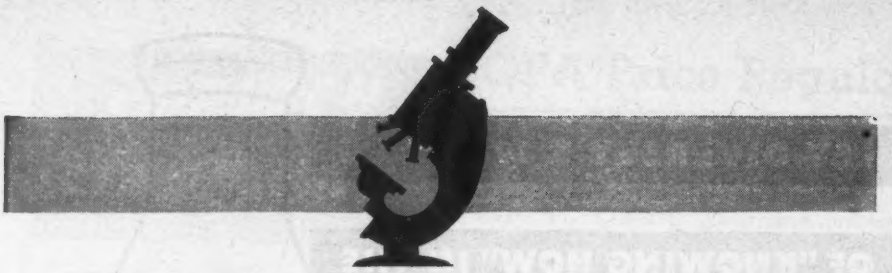

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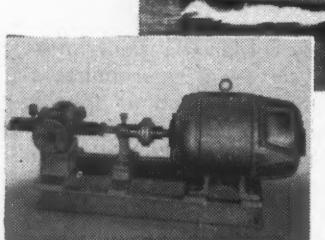
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CEDAR FALLS IOWA

Outlook for Corn Products Dull

Smaller crop, less carry-over and high feed requirements affect future supply

THREAT of a prolonged shortage of corn sirup, dextrose and cornstarch was temporarily removed when wet grinders were able to purchase an estimated 30 days' supply of corn in one hectic day. The occasion was the August 10 deadline for the government guarantee that farmers selling corn would be protected against an increase in the ceiling price made prior to October 31. Members of the trade felt that the improved condition could be counted upon until the end of the crop year and possibly longer.

Food processors have a barometer that will indicate whether the supply of corn sugar, corn sirup and cornstarch will be easy or tight. The indicator will be the government policy in regard to the feeding of livestock. If hogs are to be fed to excessive weights instead of being slaughtered at weights of from 180 to 200 lb., corn for the corn products manufacturer will likely be short. In Washington it is believed government control can be exercised only through an adjustment of ceilings on the live weight of hogs.

Sweetener Shortage Eased

Shortages in the supply of corn sugar and corn sirup facing industrial users in the July-August and September-October sugar allotment periods was relieved by the allotment of additional quantities of cane sugar. On July 10, instructions were given to OPA regional offices to make allotments of cane or beet sugar as replacement for corn sweeteners to relieve cases of extreme hardship. Replacements of corn sugar for the July-August and September-October allotment periods were set at 65 percent of the amount used in the corresponding period in 1942. Corn sirup replacements were set at 55 percent of the amount used.

Corn Crop Ten Percent Less

Prospects for an adequate supply of raw material for the wet corn grinders and hence for an adequate production of sugar and starch for food processors were not enhanced by the August crop report. If there is not enough corn available to keep the corn products plants operating in the season following the greatest corn crop on record, how is the industry to fare when the crop in prospect is roughly 10 percent less than last year's record production? Certainly the inducement to keep corn on the farm is as great as ever and the carryover from this year will be less.

Corn for the wet grinders must come from the supplies that normally would go for feed. But preliminary estimates indicate a corn supply per hog of only 38.8 bu. will prevail next year, the lowest supply per hog since 1921. The corn sugar and corn sirup supply for food processing will depend directly upon the weights to which the hogs are fed.

Report Assails Food Program

Federal study criticizes war food policies, urges changes in production schedules

SHARP CRITICISM of the administration's food program highlighted the confidential report on food submitted to Secretary of Agriculture Wickard in mid-August. The report, made by a subcommittee of the Food Advisory Committee, pulled no punches.

Failure to establish a "world-wide" food program, and adherence to the parity-price formula were criticised in the study, which proposed a production program said to provide an adequate diet for 40,000,000 extra persons in 1944 and 1945. Other recommendations were that a single government agency responsible for the production of food abroad be created; that more efficient use be made of the production resources of the small and medium size farms; that American civilian food needs "should not be considered as leftovers to be satisfied after all other claims are met"; that an adequate minimum diet be established for the civilian and fighting forces of the Allied nations; that subsidies, government purchases of food and checks on supplies at the farm level be used to combat black-markets and that the government "take the public into its confidence."

Drastic measures were recommended for the war food production program, including the recommendation that sugar beet acreage be cut one-fourth in irrigated areas and eliminated altogether in nonirrigated areas, a proposal that was sure to meet Congressional opposition. The report also urged heavy liquidation of livestock in 1944 to save feed and a huge increase in soybeans, peanuts, potatoes, flaxseed and vegetables.

The subcommittee handling the report was headed by E. W. Gaumitz of the Office of Economic Warfare. Other members were: Abe Fortas, Department of Interior; Dewey Anderson, Department of State; Bernhard Knollenberg, Office of Lend-Lease Administration; Brig. General Carl A. Hardigg, War Department; and J. M. Cassels, War Food Administration.

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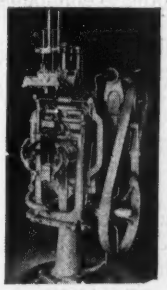
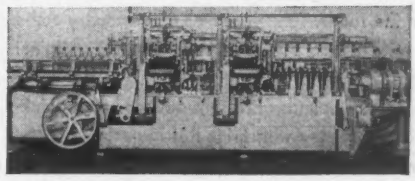


WORLD Model S Semi-Automatic Labelers apply front, back, body, neck or all around labels to every size and shape of container from samples to gallons.



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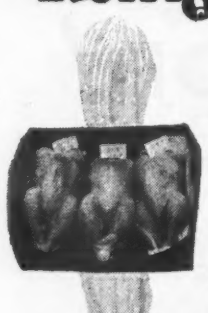

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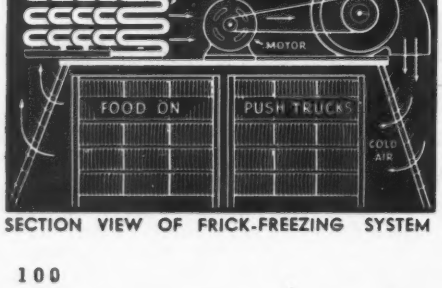

SECTION VIEW OF FRICK-FREEZING SYSTEM

CAPITAL VIEWS

MILK PRODUCTS—Relative importance for public consumption will determine what milk products can be made in the near future. In certain milk sheds drastic curtailment of manufacture is necessary or serious shortages of fluid milk and butter will follow. Apparently other milk products are relatively "luxury items." Thus, ice cream, cheese and important manufactured foods will be less available so that the more immediately esesntial fluid milk and butter can be supplied.

REFRIGERATION PRIORITIES—There is not enough refrigerated storage space available for foods, beverages and other products that need cold storage. The War Food Administration has had to establish a list of priorities on the use of the limited space. It considers alcoholic beverages, dried milk products, and many of the canned or sterile container goods as less in need of refrigeration than other foods. This will handicap many manufacturers. It will also affect plant methods. Particularly, it is going to make more necessary than ever adequate protective packaging, so that storage under less favorable conditions will be possible without spoilage. This is only one more of the ways in which war conditions emphasize the need for better food technology.

MONOPOLIES VIA OPA—The reformers and New Dealers of OPA will probably be surprised to know that they are encouraging industrial monopoly. This is merely another evidence of the way in which inexperienced or academic management of business matters does things that are not intended. The particular case which stirs this comment is a set of price ceilings on specialty foods for infants. These have been so formulated as to give virtual monopoly to certain nationally advertised patent foods as contrasted with other commodities whose distribution is being handicapped relatively. Most folks would certainly not expect OPA to be a monopoly maker even in this fashion. But it is.

SPECIALTY WRAPPINGS—The use of grease-proof paper, glassine and other specialty wrapping materials is being restricted sharply. Shortage of raw materials explains the action. Food technologists must immediately study their essential requirements for these packaging materials. Only when a real need in the interest of the public can be proven will the user be safe in getting further supplies. Many food technologists are going to be forced to ingenious substitutions, or the use of definitely inferior packaging materials.

FRUIT IS FOOD—The scarcity of foods is well illustrated by the recent rulings forbidding the making of wine from any fruit which can be marketed for canning of for immediate home consumption. This will pinch hard on some of the beverage industries. But the pinch is only typical of that which is going to continue for two or three years where nonessential products or luxury items are made instead of more essential goods. This is unpleasant for many worthwhile divisions of the food business. But there is no use winking at the fact and waiting too long for new plans.

GET IN THE EMPTIES—Food companies using returnable containers need the empties returned as promptly as possible. The public is beginning to realize its responsibilities. Advertising with a patriotic appeal for return of empty containers now has unusual pulling power. Those companies that evidence the most effort in this direction are likely to get the most sympathetic aid when they want to order replacement stocks of containers.

PACKAGE SIZES—There is a strong trend in Washington which grows from year to year toward simplification of package sizes. This trend more and more includes criticism of packaging in odd sizes, especially fractional units just a little less than a pound or just a little less than a pint or a half-pint. The use of such packages is regarded by quite a number of folks in the Capital City as a variety of "short measure." As packaging plans are made, even those of emergency nature, food executives should not ignore a trend toward simple multiples of the pound, the ounce, the quart or the fluid ounce, as may be appropriate.

VICTORY LET-DOWN—The relief which follows outstanding victory brings an unfortunate let-down with labor, agriculture and all the rest of us. Food plants can least of all afford this. Even if complete military victory comes this year, which we fear is unlikely, the job of processing food for long-distance hauling and long keeping without refrigeration will continue two or three years more. The postwar period will be as much of a test of the food business as these war years. Certainly it will take three or four years after release from occupation for many countries to rebuild the animal population which they need. Meantime, Uncle Sam will have to help provide them protein foods, and perhaps others. Perhaps there is one minor comfort to the food executive in all this. He can point out to his workers that they are much more likely to be kept on even if there be a post-war depression than the employees in munitions plants.

SCHEDULE OF EVENTS

SEPTEMBER

6–10—Agricultural & Food Division, American Chemical Society, Pittsburgh, Pa.
16-17—National Food Conference of Consumers and Producers, Hotel Sherman, Chicago.
21-24—Army and Navy Paper Requirements Conference and Exhibit, sponsored by TAPPI and covering packaging problems, Palmer House, Chicago.

OCTOBER

3– 9—Fire Prevention Week.
18–19—Boston Conference on Distribution, annual meeting, Hotel Statler, Boston, Mass.
4-Dec. 22—Winter Course in Dairy Manufacturing, University of Wisconsin, Madison, Wis.

REPLACES PROFESSOR IN OPA

James F. Brownlee, formerly head of the sales planning division of General Foods Corp., New York, has been appointed OPA deputy administrator in charge of prices. He succeeds Donald H. Wallace, who had been acting deputy since the resignation of J. Kenneth Galbraith in June, Mr. Wallace being one of three OPA executives who have been retained as "economic advisers" but deprived of their policy-making posts in accordance with the mandate of Congress that those without direct business experience cannot hold such positions in OPA.

Processors Get More Sugar

OPA increases allotment to 80 percent for all industrial users; makes other changes

FOOD PROCESSORS last month received some relief from the tight raw-materials situation in which the 70 percent sugar quota has held them for many months. On August 9 the OPA announced a flat percentage increase in sugar allotments to all industrial users, raising the quota to 80 percent. And this was only one of a number of adjustments made to make business life happier for industrial users of sucrose.

OPA made four amendments to Rationing Order 3, these taking effect on August 14. In addition to increasing the general allotment to 80 percent, the amendments provided: (1) An adjustment in allotments to industrial users who deliver sugar-containing products in counties in which there have been significant population changes; (2) changes in the sugar zones; (3) continuation through Sept. 30, 1943, of the temporary increases in allowable inventories of retailers and wholesalers.

The new zoning changes tend to reestablish, as nearly as possible, the prewar trading areas of the primary distribu-

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tors. This is reflected in the fact that the Gulf and Atlantic refiners, together with importers of off-shore refined sugar, will be permitted to serve all states east of the Mississippi River.

The foregoing changes in the sugar rationing regulations are in addition to two others recently announced. These were an increase in the provisional allowance of sugar for commercial canning of the 1943 fruit crop and the replacement of corn sugar and corn sirup with rationed sucrose.

Realizing that the overall increase in the sugar allotment is not sufficient to permit the required production of some necessary food products, the OPA on August 14 made additional special allotments for the manufacture of low-sugar breakfast cereals and bakery products and fruit preserves. The increases allowed vary, with a supplementary allotment of approximately 20 percent stipulated for bakery and cereal products and about 40 percent for the increased manufacture of fruit spreads. All supplementary allotments must be used in the production of the types of food for which they were allocated, although the amount of sugar used in the production of each type may vary. The allotments were granted in Amendment 77 to Rationing Order 3.

WPB Orders

Fiber Drums—A shortage in the supply of fiber drums for defense made necessary an amendment to M-313 on August 2, restricting the shipping of fiber drums from manufacturer to purchaser except as specifically authorized by WPB. On and after September 1, 1943, no manufacturer may use any fiber drums for packing his products except as specifically authorized.

Domestic Dehydraters—To maintain the original program for production of 100,000 domestic food dehydraters, WPB on August 10 announced an amendment to Schedule A of L-308. Five new manufacturers have been granted production quotas in accordance with the recommendations of the Smaller War Plants Corp., and two manufacturers have had their quotas increased.

Refrigerants—Interpretation 1 of M-28, issued July 29, requires that the monthly inventory reports called for under the order (chlorinated hydrocarbon refrigerants) must be made regardless of whether the refrigerants are held by owners for their own use or for resale. The report must include all stocks not actually being used in refrigerating or air conditioning systems.

Tinplate—Conservation Order M-81 was amended for the nth time late in July, clarifying terms of the original order. When tinplate is specified for the manufacture of cans for packing a particular product, the coating indicated represents the maximum weight of tin coating per base box. The term "0.05 tinplate" or "0.75 tinplate" includes "menders" arising in the production of such tinplate which has been hot dipped with a maximum tin coating of 1.25 lb. per base box. Specifications for the use of 0.05 tinplate or chemically treated blackplate until Sept. 30, 1943, are listed in the revised order.

Textile Bags—An amendment to M-221, issued July 17, restricts the export of any empty new or used burlap textile bags. Quota restrictions on the use of burlap bags are listed for beans, meal, potatoes, processed feed, rice, salt, seeds, starch and sugar.

Wooden Shipping Containers—Schedule A of L-232 was revised in an amendment issued on July 23 restricting the commercial manufacture of wooden parts designed for any wooden shipping container which does not meet specifications of any of the several tables of Schedule A applicable to that kind of container. To promote salvage and reuse of the containers, no manufacturer is permitted to dye, stain or otherwise color containers or container parts.

Molasses—The current importance of molasses in the food industry was further emphasized in an amendment to M-54 issued July 22. No purchaser shall accept deliveries of molasses in excess of the fol-

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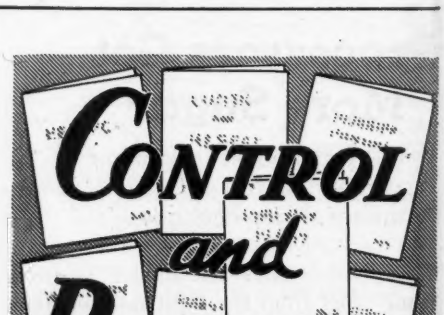

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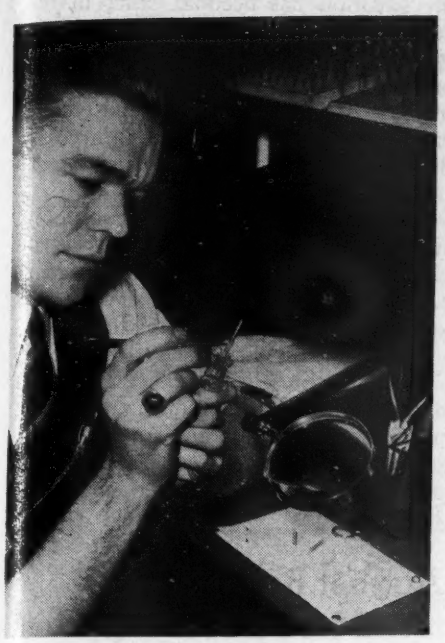

SPAGHETTI USED AS TOOL

Spaghetti, of all things, is being utilized as a tool for speeding the manufacture of electronic tubes. A young electronics engineer at the Westinghouse Lamp Division discovered that the time required to assemble certain tube filaments can be reduced by 75 percent by placing a stick of spaghetti inside a tiny wire coil to support it while it is being welded. Steel formerly was employed, but it was difficult to remove, while the spaghetti can be quickly burned out. The picture shows pieces of spaghetti on paper at lower right and a piece inside the coil of the tube in the worker's hand.

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lowing quantities less any quantity in excess of a 30-day supply on hand on the first day of the calendar quarter: Class 1 purchaser—during any calendar quarter, 40 percent of a calendar quarterly supply if molasses is required for the manufacture of sugar for human consumption (produced from beet molasses); 100 percent of a calendar quarterly supply if molasses is required by such Class 1 purchaser for the manufacture of any other product.

Raises Barrel Quotas

APPROXIMATELY 18,750,000 wooden barrels and kegs required to pack food, wines and other essential products will be supplied by the cooperage industry in the fourth quarter of 1943. Following meetings of the slack and tight cooperage industry advisory committees, the Containers Division of WPB announced that the tight-cooperage industry will be expected to furnish about 3,750,000 barrels and kegs, and the slack-cooperage industry approximately 15,000,000. For the year 1944, it is expected that the combined cooperage industries will produce 75,000,000 barrels and kegs of all types needed in the war effort.

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CONSTRUCTION NEWS

	Pending (thousands)	Awarded August (thousands)	Total Awarded 1943 (thousands)
Bakery	.....	.....	.....
Beverages	.....	.....	.....
Canning and Preserving	$40	.....	$155
Cold Storage	160	.....	385
Confectionery	.....	.....	40
Grain Mill Products	220	$90	1,887
Ice Manufactured	.....	.....	40
Meats and Meat-Products	80	.....	285
Milk Products	190	.....	572
Miscellaneous	330	100	2,651
	$1,020	$190	$6,015

WFA Extends Scope of Support Price Program

URGENT need for capacity output of fruits and vegetables to meet war demands has accelerated WFA's support price program. Following up the July program for purchasing quantities of canned tomatoes, tomato juice, tomato pulp, tomato paste, sweet corn, snap beans, green peas, lima beans, beets and carrots, WFA on August 2 announced support prices for West Coast natural condition raisins and dried prunes. Grower prices for raisins are: Thompson seedless, $155 per ton; Muscats, $165; Sultanas, $150. Purchases of dry whole peas will be made by FDO at levels in keeping with support prices for 1943 crop dry whole smooth and wrinkled peas to which the Department of Agriculture is committed.

Glass Container Quotas Up

INCREASED glass container quotas were authorized for certain food products in WPB's new amendment to L-103, issued August 24. Shortening manufacturers profited by the action, obtaining unlimited use of glass containers, and coffee roasters' use was increased by changing the percentage upward to 75 percent of the base year of 1941 rather than 1942 as provided previously. Beverage manufacturers were granted only a fractional use increase as WPB changed the computation method for this industry. Use of metal for closures for coffee and shortening was banned.

Fats and Oils Supply Situation Eases

PARTLY through rationing of consumption, partly through increased domestic production and partly through improvement in imports, the fats and oils supply situation has become easier in recent months. While still tight enough to make continued rationing necessary, particularly in view of probable increases in military and Lend-Lease needs, sufficient supplies for all necessary purposes during the 1943-1944 crop year seem to be available.

The effect of rationing on consumption is indicated by the present situation with respect to lard. In 1942, from January 1 to May 1, domestic lard disappearance was 498,823,000 lb., while in the same period this year, it was 488,795,000. At present, with increased production of lard, and some lowering in price, stocks are building up; so much so that early in August 26,000,000 lb. of edible lard was converted into soap stock.

August Reports Show More Food Supplies

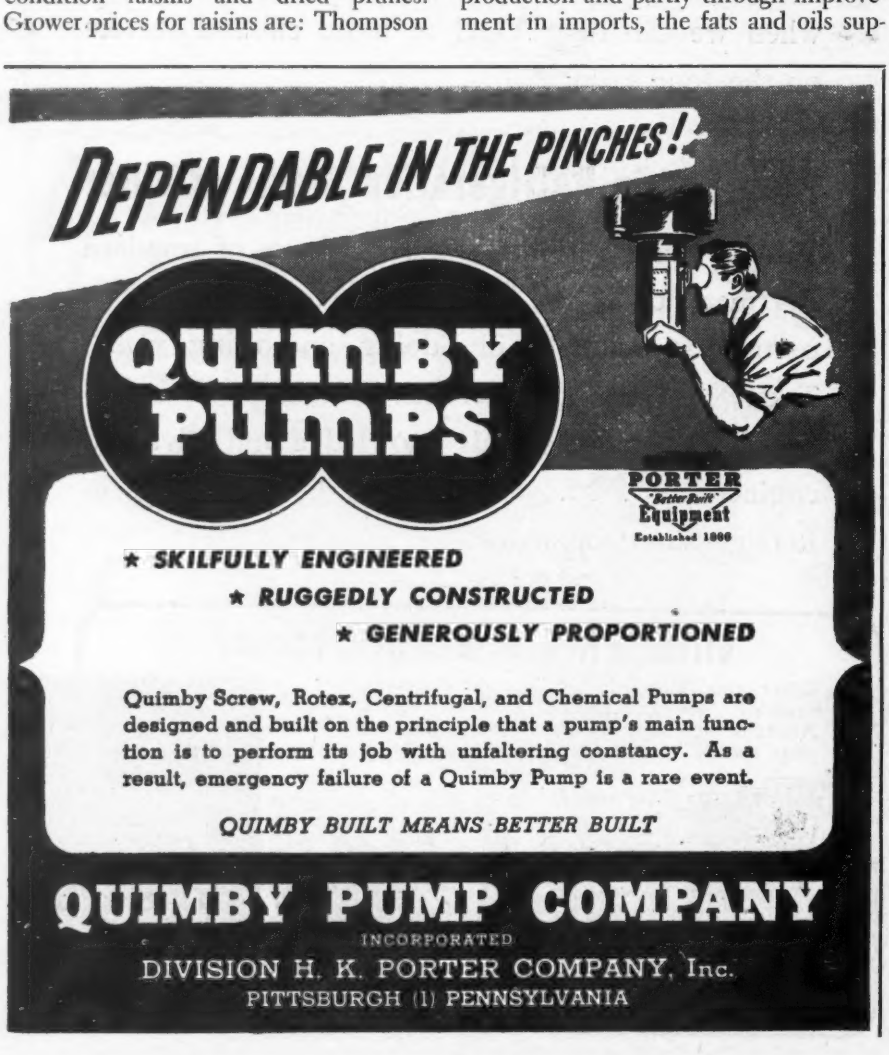
WITH the August 10th report of the Crop Reporting Board, it became evident that food raw material supplies for the 1943-1944 crop year will be more abundant than had been earlier feared. In fact, if livestock comes to market in expected quantities during the fall and early winter, total available food supplies are likely to exceed those of the preceding (record) year.

One of the most hopeful factors in the situation is the continued improvement in the estimates for the corn and wheat crops. The corn crop is expected to be 2,874,711,000 bu., the second largest crop in ten years and higher than the August 1 estimate in 1942. It will be recalled that the 1942 corn crop was finally recorded at 3,175,154,000 bu., although the August 1, 1942, estimate was only 2,753,696,000 bu. With continued favorable weather, this year's final corn yield might well also be above the August 1 estimate.

Wheat, both winter and spring, were estimated on August 1 as totaling 834,894,000 bu. This compares with a harvest last year of 981,327,000 bu. The estimate on July 1, 1943, for the current wheat crop was 790,823,000 bu.

Prospects for other small grains—barley, rye and rice, show no improvement over the figures given out a month earlier. Of these, barley and rye yields are expected to be greatly below 1942 crops, but rice output should show an increase of about 7 percent over 1942.

Prospects for feeds for livestock also are encouraging. The output of tame hay, at 87,613 tons, is the second largest on record and the production of grain sorghums, forecast at 124,350,000 bu. compares to 107,245,000 bu. produced in 1942. Oats are expected to be above the ten-year average, at 1,189,546,000 bu., although slightly below last year's output. Also, a crop of soybeans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about equal to the 1942 harvest and a record peanut crop of 2,986,450,000 lb., combined with a 34 percent increase in flaxseed and a cotton crop nearly as large as in 1942, promise a yield of oil cake and protein feeds at least as great as last year.

Other high spots in the August crop forecast include a potato crop of 443,067,000 bu., compared to a 1942 harvest of 371,150,000 bu.; a dry edible bean crop of 22,845,000 bags, compared to 19,608,000 bags last year; and a sweet potato crop of 81,255,000 bu., compared to 65,380,000 bu. in 1942 .

The bad spot in the crop picture continues to be the prospects for fruit, with output of apples, pears and peaches estimated to be far below 1942 crops; and grapes, with a slight increase over last year, the only fruit to show improved prospects.

Truck crop production for the fresh market shows improvement in the August report over the July outlook. Excluding cantaloups and watermelon, commercial truck crop production is now estimated to be only 2 percent below last year and 13 percent above the 1932-1941 average.

INDICATORS

Cocoa beans imported into the United States, from January 1 to August 15, 1943, totaled 2,571,062 bags, compared to 874,101 bags in the corresponding period of 1942.

Sugar, raw, arriving at United States ports during the first seven months of 1943 totaled 2,185,568 tons, compared to 1,608,295 tons during the corresponding months a year earlier.

Salmon canned in Alaska in 1943 up to July 24 amounted to 2,660,667 cases, compared to 1,492,749 cases for the corresponding period of 1942. The greatest increase was in the red variety, which increased from 722,672 cases to 1,755,058 cases.

Tuna canned in California up to July 30, 1943, totaled 713,309 cases, compared to 532,159 cases for the corresponding 1942 period.

Tomato catsup packed in 1942 totaled 11,770,819 cases, all sizes, according to National Canners Association.

Tomato production for processing in 1943, according to the August report of the U. S. Department of Agriculture, will be 3,102,000 tons, compared to 3,166,700 tons in 1942. This expected output is 71 percent over the 1932-1941 average production.

Sweet corn production for processing in 1943, according to the August report of the U. S. Department of Agriculture, will be 1,287,000 tons compared to 1,281,300 tons produced in 1942. This compares to average production of 713,400 tons in 1932-1941.

Snap bean production for processing in 1943, according to the August report of the U. S. Department of Agriculture, will be 251,150 tons, compared to 234,800 tons in 1942 and to an average of 91,600 tons in 1932-1941.

Chicks produced by commercial hatcheries in June, 1943, totaled 188,726,000, a record for the month, comparing to 121,799,000 in June, 1942, and to a 1938-1942 June average of 92,711,000 chicks.

Oleomargarine sales in June, 1943, as indicated by sales of internal revenue stamps, totaled 18,090,580 lb., a drop of 23 percent below sales in June, 1942. Sales for the first six months of 1943 were 236,221,307 lb., an increase of 42 percent over sales for the corresponding months of the preceding year.

Eggs produced by commercial egg breaking plants in June, 1943, totaled 177,711,000 lb., an increase of 32 percent over June, 1942.

Eggs, dried, produced in June, 1943, totaled 25,884,000 lb., compared to 22,282,000 lb. in June, 1942.

Evaporated milk produced in June, 1943, was 386,000,000 lb., 3 percent below production in June, 1942, but 34 percent over the 1937-1941 June average.

Condensed milk, all kinds, produced in June, 1943, was 93,422,000 lb., compared to 84,211,000 lb. in June, 1942.

Milk, dried, whole, produced in June, 1943, was 14,500,000 lb., compared to 6,069,000 lb. in June, 1942, and 406 percent greater than the average June production in 1937-1941.

Milk, dry skim, produced in June, 1943, totaled 63,325,000 lb., 17 percent below production in June, 1942, but 21 percent over the average June production in 1937-1941.

Butter, creamery, produced in June, 1943, totaled 202,195,000 lb., compared to 201,110,000 lb. in June, 1942, and to an average June production in 1932-1941 of 198,848,000 lb.

Butter, creamery, produced in the first six months of 1943, totaled 927,865,000 lb., up 1.1 percent over production in the corresponding period of 1942 and 3.2 percent above the average production in 1932-1941 for the period.

Cheese, American, produced in June, 1943, totaled 97,600,000 lb., compared to 113,167,000 lb. in June, 1942, and to an average for June in 1932-1941 of 65,542,000 pounds.

Cheese, American, produced in the first six months of 1943 totaled 403,425,000 lb., off 24 percent from production in the corresponding 1942 months, but 59.4 percent over the 1932-1941 average production for the period.

Acreage planned by War Food Administration for 1944 crops is now set at 380,000,000 acres, compared to 364,000,000 acres this year and to 377,000,000 acres in 1942.

Cranberry output this year is not expected to exceed 500,000 bbl., compared to 540,000 bbl. harvested in 1942.

Fruits, frozen, in storage on August 1, 1943, totaled 161,958,000 lb., compared to 186,003,000 lb. on August 1, 1942, and to a August 1 average of 164,459,000 lb. in 1938-1942.

Vegetables, frozen, in storage on August 1, 1943, totaled 97,343,000 lb., compared to 88,248,000 lb. on August 1, 1942, and to an average of 68,493,000 lb. for the date in 1938-1942.

Butter, creamery, in storage on August 1, 1943, totaled 209,845,000 lb., compared to 148,504,000 lb. on August 1, 1942, and to a July 1 average in 1938-1942 of 157,812,000 pounds.

Cheese, all kinds, in storage on August 1, 1943, totaled 182,519,000 lb., compared to 296,763,000 lb. on August 1, 1942. The average for the date in 1938-1942 was 171,449,000 lb.

Eggs, case equivalent, in storage on August 1 of this year was 18,023,000 cases, compared to 15,501,000 cases a year earlier, and to an average for August 1 in 1938-1942 of 12,008,000 cases.

Poultry, frozen, all kinds, in storage August 1, 1943, amounted to 38,592,000 lb. The figure on August 1, 1942, was 79,346,000 lb., and the average for August 1 in 1938-1942 was 72,105,000 pounds.

Meat, all kinds, in cure and frozen storage on August 1 of this year totaled 755,698,000 lb., compared to 631,072,000 lb. on August 1, 1942, and to an average of 620,591,000 lb. for the date in 1938-1942.

Lard in storage August 1, 1943, totaled 210,791,000 lb. and rendered pork fat on the same date was 28,362,000 lb. The combined figure for these products a year earlier was 98,349,000 lb., and the average combined figures in 1938-1942 was 201,066,000 lb. for the same date.

Weekly wholesale food price index of Dun and Bradstreet stood at $4.04 on August 3, 1943, compared to $4.06 on July 13 and to $3.74 on the corresponding August date of last year.

Business activity index of *Business Week* was 211.8 on August 7, 1943, compared to 209.2 a month earlier and to 184.9 on the corresponding 1942 date.

Cost of living index of National Industrial Conference Board was 103.1 on July, 1943, compared to 104.3 in June, 1943, and 97.8 in July, 1942.

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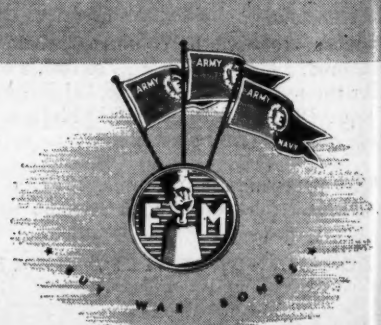


MEN • JOBS • COMPANIES

INDUSTRY

Borden Co., New York, has recently acquired Soy Bean Processing Co., Waterloo, Iowa, to expand its facilities for the manufacture of vitamin-fortified supplements for poultry and animal feeds.

Consolidated Elevator Co. has sold all of its terminal elevators and property in Duluth, Minn., to General Mills, Inc., Minneapolis, Minn., and plans to retire from business.

Crosse & Blackwell Co., McCormick & Co., both in Baltimore, Md., Standard Margarine Co., Indianapolis, Ind., and the Gilroy, Calif., dehydration plant of C. B. Gentry Co. have been awarded the Army-Navy "E" for excellence in production. The Gilroy branch is the first dehydration plant to have been awarded the "E" pennant. Swift & Co.'s Chicago plant has been presented the white star for its pennant, marking the first meat packing unit to receive such an award.

Downyflake Fixit Food Products, a division of Doughnut Corp. of America, has issued a 40-page illustrated booklet, "How to Maintain Fine Quality Baked Goods Under Today's Conditions," interpreting the nutritious quality of its prepared dry mixes through the publication of 100 household recipes.

Fairoaks Fruit Corp., newly formed organization with headquarters in San Francisco, Calif., has taken over the olive acreage, ripe olive canning plant and olive oil mill of Fairoaks Fruit Co. at Fairoaks, Calif.

Food Products Corp., Kansas City, Mo., manufacturer of baker's specialties, has acquired Blaker Milling and Elevator Co., Pleasanton, Kan., to meet the increasing demand for its products. The mill will begin operation under the name of Ray Milling Co. by October 1.

B. E. Glick & Sons, Corning, Calif., is operating a community canning project. One day a week, the local people bring in their nonacid vegetables to be canned, and are charged 10 cents for the canning of each No. 2½ jar.

S. J. Huxley Canning Co., Ontario, N. Y., has recently been damaged by fire with losses estimated at $200,000.

Kellogg Co., Battle Creek, Mich., has acquired a long-term lease on the Miller cereal plant in Omaha, Neb.

Max Ams, Inc., has acquired Falk Products Co., Cadillac, Mich. Falk Products, manufacturer of potato flour and other kinds of flours, will continue as a division of Max Ams.

ROY H. WALTERS

General Foods Central Laboratories at Hoboken, N. J., has appointed Roy H. Walters to the position of director of engineering research. Mr. Walters has worked on chemical projects since he joined General Foods in 1934.

JAMES M. ELLIOTT

James M. Elliott, formerly executive vice-president and general manager, has been promoted to the office of president and general manager of John F. Jelke Co., Chicago, manufacturers of Good Luck Margarine and other food products.

Herbert A. Nieman & Co., Cedarburg, Wis., is now using a new process, perfected in 1942, for preserving peas for soups. The peas are salted and stored in a cold storage warehouse until used.

Shedd Products Co., Detroit, Mich., has changed its name to Shedd-Bartush Foods, Inc., incorporating the name of its president, Stephen J. Bartush.

DR. O. F. GARRETT

Formerly Assistant Professor of Dairy Manufactures at the New Jersey Agricultural Experiment Station, New Brunswick, N. J., Dr. O. F. Garrett has resigned his professorship to become head of the research department of M & R Dietetic Laboratories, Columbus, Ohio, manufacturer of dietetic foods. Dr. Garrett was secretary of the Metropolitan Dairy Technologists Association of New York.

PERSONNEL

J. M. Allen, formerly a director of Shellabarger Mill & Elevator Co., at Salina, Kan., has been oppointed president of the company, succeeding the late L. C. Shellabarger.

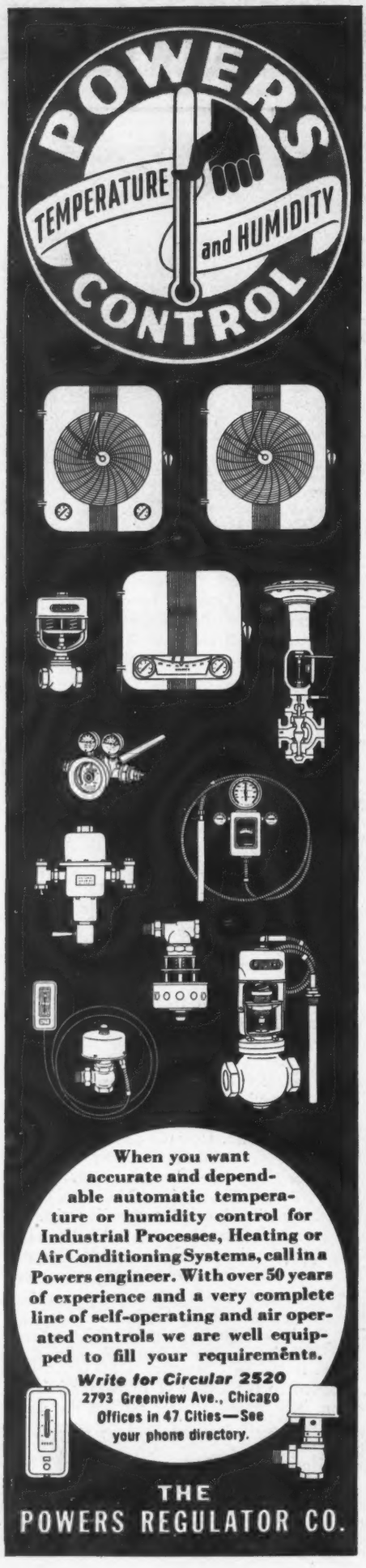
R. H. Amenta, Florida Dehydration Co., Zellwood, Fla., has returned to the Fruit and Vegetable Division of the War Food Administration in Washington, D. C.

Ben Batchelor, formerly a member of the research department of American Can Co., in New York, is now with Larsen Co., Green Bay, Wis., succeeding Fred H. Dellwo, who left to go with Cascade Frozen Foods, Seattle, Wash.

A. B. Carver, formerly superintendent of Buffalo Flour Mills Corp., Buffalo, N. Y., has been appointed general superintendent for Commander-Larabee Milling Co., in Minneapolis, Minn., succeeding M. C. Belan. Mr. Belan has resigned his position to become vice-president in charge of production for Colorado Milling & Elevator Co., Denver, Colo.

E. M. Chace, of the Los Angeles, Calif., laboratory of the Bureau of Agricultural and Industrial Chemistry, USDA, has been loaned to the Office of Economic Warfare and will spend several months in Brazil, assisting that nation's food program.

Eugene M. Funsten, of the R. E. Funsten Co., St. Louis, Mo., and Julius Seligmann, Southern Pecan Shelling Co., San Antonio, Tex., have been elected president and vice-president, respectively, of the newly


POWERS
TEMPERATURE and HUMIDITY
CONTROL
When you want accurate and dependable automatic temperature or humidity control for Industrial Processes, Heating or Air Conditioning Systems, call in a Powers engineer. With over 50 years of experience and a very complete line of self-operating and air operated controls we are well equipped to fill your requirements.
Write for Circular 2520
2793 Greenview Ave., Chicago
Offices in 47 Cities—See your phone directory.
THE
POWERS REGULATOR CO.

formed organization known as the National Pecan Shellers and Processors Association.

Edwin W. Gaumnitz has been appointed executive-secretary of the National Cheese Institute. Mr. Gaumnitz is well known in the dairy industry, having been senior economist in the division of dairy and poultry products in the Department of Agriculture for 12 years.

Daniel F. Gerber, vice-president of Gerber Products, Inc., has resigned his post as business consultant of fruits and vegetables in the Grocery Products Branch of OPA and plans to devote his full time to his company.

H. H. Hallauer, Valley Evaporating Co., Wenatchee, Wash., has been elected president of the Northwest Dried Fruit Association.

G. W. Knauth, formerly New York representative and raw sugar buyer for Pennsylvania Sugar Refining Co., in 1942, has been appointed manager of the raw sugar and export departments of National Sugar Refining Co., New York, N. Y.

Harold S. Levenson, research project leader, has been made a division head in the physical chemistry section of General Foods Central Laboratories, at Hoboken, N. J. John H. Lutz becomes a research staff project leader in charge of packaging research, and M. O. Ricker has joined the research staff as project leader in the engineering research section.

H. F. Krimendahl, president of Crampton Canneries, has been elected chairman of the board of W. R. Roach Co., Grand Rapids, Mich., in which he has recently acquired a controlling interest.

Charles C. McGehee, former assistant to Lend-Lease Administrator Edward R. Stettinius, Jr., has joined Pepsi-Cola Co. as assistant sales manager.

L. B. Pearson, minister counsellor of the Canadian legation in Washington, D. C., has been chosen permanent chairman of the newly organized United Nations Interim Commission on Food and Agriculture. The commission, which represents 44 counties, has been formed to draft plans for a post-war world freed from hunger.

Walter A. Reed and Howard C. Lawence have been appointed president and vice-president, respectively, of the Lake Odessa Canning Co., Grand Rapids, Mich.

E. E. Rice, Louisville, Ky., has recently been named president of the West Tennessee Soya Mill, Inc., Memphis, Tenn.

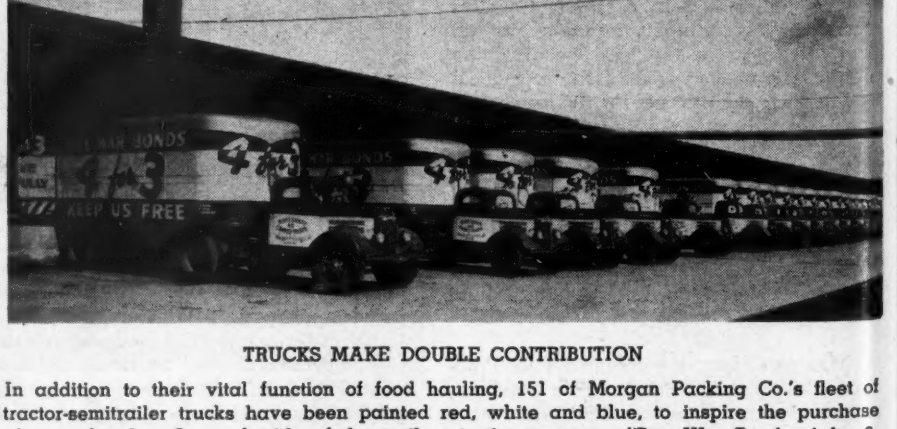
John W. Rose has been named general sales manager of Libby, McNeill & Libby, Chicago food canners, succeeding C. S. Bridges, who was recently appointed vice-president.

Ralph Schust, manager of the Saginaw, Mich., bakery of Loose-Wiles Biscuit Co., has been elected to the office of vice-president. He has had general supervision of the company's operations at Cleveland, Pittsburgh and Dayton as well as the Michigan territory. His new position also includes the New York and Boston areas.

Nell Snavely has been elected director of Holsum Products' Home Economics Department in Milwaukee, Wis. She will supervise the expanded kitchen laboratory, particularly the development of "Peanut Crunch" peanut butter and "JAH-Vah" beverage cereal.

John S. Ware, of the special sugar products division of National Sugar Refining Co., New York, has resigned his position to join General Mills, Inc., Minneapolis, Minn. Mr. Ware is to go to Brazil in the fall, to be a technical representative of the company's projected Brazilian activities in food processing.

Arthur D. White, formerly in charge of the public relations department for Swift & Co., Chicago, Ill., is now vice-president and manager of the Institute of Public Relations in New York.



TRUCKS MAKE DOUBLE CONTRIBUTION

In addition to their vital function of food hauling, 151 of Morgan Packing Co.'s fleet of tractor-semitrailer trucks have been painted red, white and blue, to inspire the purchase of more bonds. On each side of the trailers is the message—"Buy War Bonds, 4 for 3, Keep Us Free." On both the front and back is the phrase, "4 for 3."

DEATHS

Emil S. Brykczynski, 85, president of the George F. Stuhmer Baking Co., Brooklyn, N. Y., for 41 years, August 11, in Brooklyn.

Joseph D. Cauley, 49, retired general manager of Lang Bakery, Inc., Buffalo, N. Y., and a noted bakery executive, recently, in Weston Mills, N. Y.

Franklin L. Homan, 77, president of the American Oyster Co. for 51 years, and a past president of the Rhode Island Oyster Growers Association, recently, in Providence, R. I.

Edward J. Hood, 80, retired vice-president of H. P. Hood & Sons Co., one of New England's largest milk concerns, August 11, in Newton City, Mass.

George O'Hara, president of La Manna, Azema & Farnan, Inc., New York importers of fancy food products, August 5, in Short Hills, N. J.

William J. Reichert, 79, president of Reichert Milling Co., Freeburg, Ill., recently, in Freeburg.

O. D. Sylvester, 50, bakery consultant for Standard Brands, Inc., New York, N. Y., recently, in Bangor, Me.

ASSOCIATED INDUSTRIES

American Viscose Corp.'s Marcus Hook, Pa., plant; the Pittsburgh, Calif., plant of the Great Western Division of the Dow Chemical Co.; and both divisions of the Waukesha Foundry Co. at Waukesha and Watertown, Wis., have been presented the Army-Navy "E" for excellence in production. Sylvania Industrial Corp., Fredericksburg, Va., has been awarded a white star, which symbolizes winning the "E" pennant for the second time.

Continental Can Co., Inc., New York, N. Y., has appointed Elliott W. Beckett as vice-president and general manager of Continental Can Co. of Canada, Ltd., succeeding Walter M. Tomkins.

Oliver Machinery Co., Grand Rapids, Mich., has elected Ralph C. Russell as assistant sales manager of the organization. Mr. Russell, formerly manager of engineering service for the Cellophane Division of E. I. du Pont de Nemours & Co., is well known in the bakery and packaging fields for his work in the mechanical application of cellophane.

Universal Cooler Corp., Marion, Ohio, has named W. W. Higham as vice-president in charge of engineering. Mr. Higham has had a great deal of experience in engineering refrigerating units, which ties in with Universal's new war production requirements and planning for postwar developments in the expanded engineering-research department.

CORK

Deliveries Assured

REMOVAL of priority restrictions on the sale of Mundet Cork Insulation now makes this unsurpassed insulating material available for all low-temperature uses.

This is good news for refrigeration operators. Cork's preeminence in meeting war needs has been fully recognized. Now that sufficient stocks of raw cork have been accumulated to assure these vital uses, and with fresh shipments arriving regularly, Mundet Cork Insulation is once more available for commercial applications.

The qualities in Mundet Cork Insulation that caused it to be specified for important war projects recommend it also wherever low temperature must be controlled and conserved most economically. Mundet Cork Corporation, Insulation Division, 65 South Eleventh Street, Brooklyn 11, N. Y.

MUNDET
CORK INSULATION

CONSERVES LOW TEMPERATURE
for COLD STORAGE . . . QUICK FREEZING . . . LOCKERS

Reproduction of column appearing in national news magazines

Patapar NEWS

No. 105-A Bristol, Pa.

Protecting Your Foods Patapar's No. 1 Job

In the food industry Patapar* Vegetable Parchment has been giving faithful service for over half a century, packaging and protecting literally thousands of products. Its wide use is the result of unique qualities. It resists grease. It is insoluble—can even be boiled without harm.

Butter, meats, fish, shortening, ice cream, cheese, tea, coffee are just a few of the foods that look to Patapar for protection.

War Needs Bring Unexpected Uses

Today's pressing demand for efficient materials to fill war needs has brought about new and unexpected applications of Patapar. Here are some examples:

Use in gas masks
Rubber mold liners
In manufacture of Plexiglas
Map tracing papers
Ointment box liners
Special photographic purposes
Liners for motor oil containers

Takes Hot Wax

Bulk wax can be packaged safely without metal containers. The method is to use a special bag made with laminated Patapar. The bag is strong and greaseproof. When the wax in hot liquid form is poured in there is no delamination—no leakage.

Solves Problem in Dye Houses

In dye houses they use Patapar to line wet-finishing trucks. This insoluble lining prevents dye from seeping into the wood bodies of the trucks. Danger of different batches absorbing the colors of previous runs is thus eliminated.

EXECUTIVES:

Patapar can be used alone as a wrapper, or in combination with other materials to form special packaging units. Different treatments can be added for different uses.

Patapar is furnished in sheets or rolls. For complete information write us outlining your requirements in detail.

*Reg. U. S. Pat. Off.

Paterson Parchment Paper Company
Bristol, Pennsylvania
West Coast Plant: 340 Bryant St., San Francisco
Branch Offices: New York, Chicago
Headquarters for Vegetable Parchment since 1885

Some of the ways

PATAPAR *can help* YOU

WRAPPERS for butter, meats, fish, cheese, lard, shortening, ice cream, vegetables, dried fruits

Carton and box liners

Bulk packaging units

Milk can gaskets

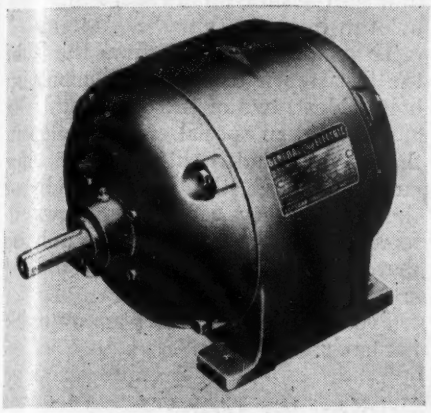
Milk bottle hoods

Packaging coffee and tea

FOOD EQUIPMENT NEWS

Totally Enclosed Motor

A LINE of totally enclosed motors has been added to its line of "Tri-Clad" motors by General Electric Co., Schenectady, N. Y. Available in both the polyphase, 60 cycle, induction type and the single phase, 60 cycle capacitor type,



New line of totally enclosed motors

these motors are designed for use where wet, excessively dirty or other conditions hazardous to good operation are found.

The polyphase motors include ½, ¾ and 1 hp. at 900 r.p.m.; ¾, 1 and 1½ hp. at 1,200 r.p.m.; 1, 1½ and 2 hp. at 1,800 r.p.m.; and 1½ and 2 hp. at 3,600 r.p.m. The single phase motors include ¾ hp. at 1,200 r.p.m.; 1 and 1½ hp. at 1,800 r.p.m.; and 1½ and 2 hp. at 3,600 r.p.m. The mounting dimensions are the same as for "Tri-Clad" open motors of the same rating.

All parts of the motor enclosure are of cast iron, giving high resistance to rust, corrosion, accidental blows and rough use. The leads are permanently encased in compound in a cast-in pocket in the stator frame, preventing liquids from seeping into the motor. Still further protection is provided by a rotating labyrinth seal that prevents dirt, oil or water from entering the bearing housing.

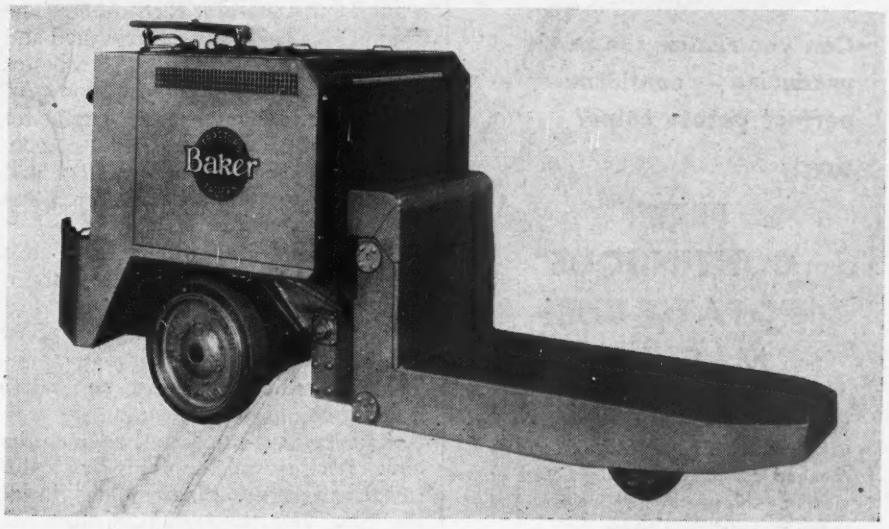
Fiber Tape Substitute for Steel Strapping

A. D. GERRARD & Co., 2700 Belmont Ave., Chicago, has brought out "Stur-D-Strap", a laminated fiber substitute for steel or wire strapping. The maker states that this material has unusual strength and can be used for the strapping of all types of packages weighing 90 lb. or less. It is water repellant, and has only 1 percent elongation; and in actual tests has shown a tensile strength of 13,500 lb. per sq. in. This strapping may be placed by use of the Gerrard "Steelbinder", or may be used in any of the standard types of steel strapping tools. It is available in 700 ft. rolls, ¾ in. wide. The accompanying photograph shows one of these rolls, also the "Steelbinder", the hammer cutter and the seal used with the strap.

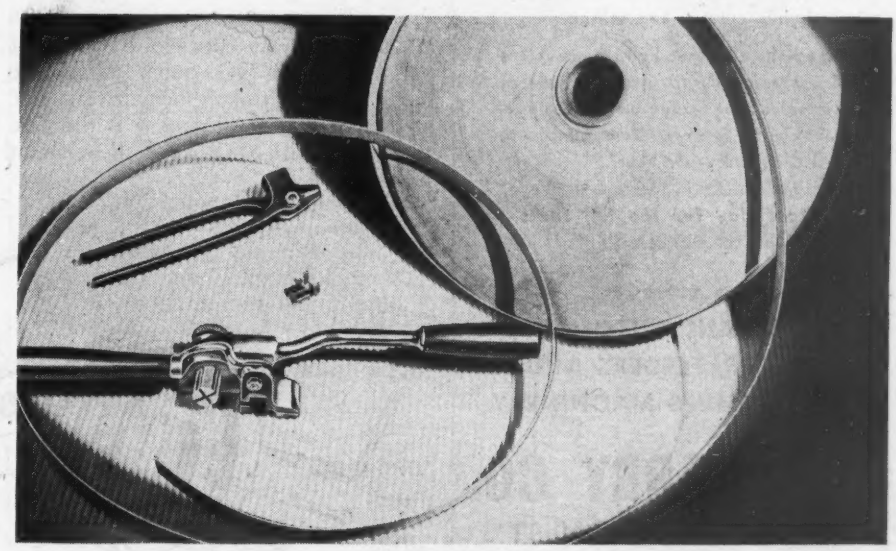
Low Lift Truck

BAKER INDUSTRIAL TRUCK DIV., Baker-Raulang Co., 2168 W. 25th St., Cleveland, Ohio, has brought out a new 4,000 lb. capacity low-lift truck known as Type E-2. In designing this new truck two advances are said to have been made: it gives longer hours of uninterrupted operation, and provides greater safety of operation through better vision by the operator.

The new truck is built on a 66-in. wheel base, and the overall length, including the operator's guard, is 123¾ in. This permits right-angle turns in aisles that are 67 in. wide. The truck has larger battery capacity than the former models of this size so that it can be operated continuously on longer shifts. In order to give better visibility the front top corner of the battery department has been beveled off, giving the operator a better view of the work.



New low-lift industrial truck having larger battery capacity and designed to give better vision of work.



A roll of fiber strapping material, together with the tools used in applying it.

In Other Words . . .
The Perfect Chip!

Can you realize the profit in producing — continuously — perfect potato chips?

WITH

FERRY CONTINUOUS POTATO-CHIP MACHINES

you are assured of a perfect product. Machine is adjustable, and quickly changed, for turning out light, dark or medium chips—all crisp, clean and salted to a delicious flavor.

Every step in the process is automatic, and there is push-button control of cleaning, peeling, slicing, frying, drying, cooling and salting.

Read how these FERRY machines will make money for you, as well as help solve the man-power shortage. Available in 5 sizes, from 50-lbs. to 350-lbs. capacity per hour.

Write today for the full facts, Ask for Bulletin "F.I"

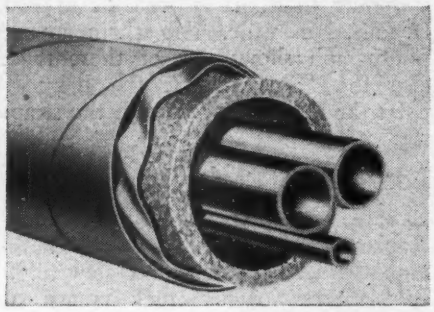
Also makers of

SLICERS AND AUTOMATIC SLICERS, FEEDERS AND CAN WASHING MACHINERY

J. D. FERRY CO.
129 SO. CAMERON ST.
HARRISBURG, PA.

Insulated Conduit

RIC-WIL CO., Union Commerce Bldg., Cleveland, Ohio, has brought out a new design of insulated conduit for carrying pipelines in which a predetermined temperature is being maintained. With this system, any specified combination of pipes can be furnished in a prefabricated conduit, with the insulation so arranged that pipes are insulated from the exterior but not from each other. The conduit is helical corrugated, coated and wrapped with asphalt saturated asbestos felt, as is shown in the illustration. Assembled units come in 21-ft. lengths for quick installation. Prefabricated connecting bands, expansion devices and all accessories required for complete systems are included.



Insulated conduit for carrying pipelines.

The manufacturer states that this unit is adapted to underground or overhead installations and can be used either for hot or refrigerated liquids with equal efficiency. A steam or hot water pipeline within the conduit can be used to heat the liquid in other lines.

A tile system, based on the same principle, is also available. This has a diatomaceous earth lining, molded inside the tile. The tile system is adaptable to underground installation only.

Quick Detachable Sheaves

PYOTT FOUNDRY & MACHINE CO., 328 N. Sangamon St., Chicago, has brought out the Type QD quick detachable sheaves for multiple V-belt drives. The feature of this development is the ease and speed with which the sheaves can be attached to or removed from the shaft, a socket wrench being the only tool needed. Referring to the accompanying illustration, the first step is to slip the tapered split hub onto the shaft in line with the keyway. Then the headless tap screw is tightened down with an inserted key, clamping the hub firmly on the shaft. Next the sheave is attached on the tapered hub. Tightening of the sheave and the hub is accomplished by inserting the pull-up bolts and tightening them evenly with a socket wrench. These bolts protrude through the sheave and engage threaded holes in the hub.

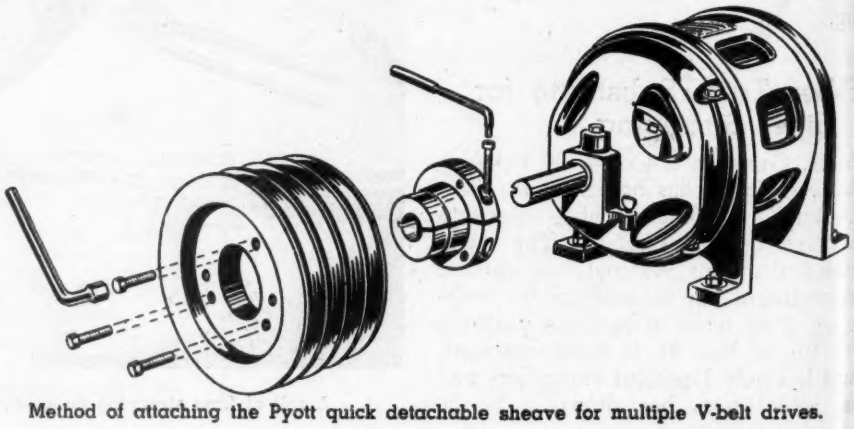
To remove the sheave from the hub, the first step is to unscrew the pull-up bolts. Next, two of these pull-up bolts are inserted in special tapped holes in the sheaves and tightened. As they emerge through the opposite side of the sheave they act as jackscrews to force the sheave away from the hub, so that no hammering or rough handling is necessary.

Pyott Type QD sheaves are available in standardized sizes.

Printer for Cans

ROTARY IMPRINTER, INC., 166 Second Ave., Brooklyn, N. Y., is supplying a rotary printing machine for use as an attachment on the feed end of roll-type labeling machines for cans. The object of this machine is to print on the body of the can, before the label is applied, information indicating the contents of

Machine for printing identification on cans before labeling.



Method of attaching the Pyott quick detachable sheave for multiple V-belt drives.

the can. This is in response to a requirement for export shipments of canned foods, which must be identified in case the label should become detached.

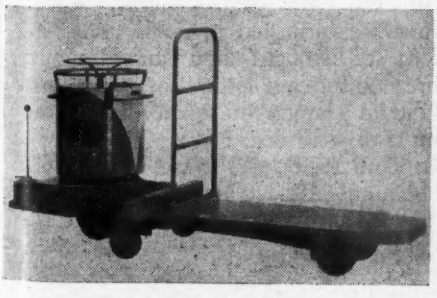
This is not a new machine, although its introduction to the food industries is new. It has been used previously for printing on the body of paint cans. In operation, the rotary printer raises and lowers when the labeling machine is changed for size, and therefore can be used to print on all sizes of the can that are handled by the labeling machine, without special adjustment. When it is desired to omit printing before labeling, this is readily done by removing the ink reservoir from the machine. The machine can also be supplied to print the net weight, name and location of the canner as well as the name of the product.

In addition to the machine built for attachment to labeling machines, the printer is also available as a separate self-contained unit with a fractional horsepower motor and drive. In this way it can be used to print on the body of either empty or filled cans while the cans are in a horizontal rolling position at any point in the can line.

Under development at the present time is a printing roller with rapidly replaceable type, by which the grade, batch number and date of date of pack can be printed on the can along with the identification. Another modification is to adapt the machine for printing on the label instead of on the can body.

Industrial Lift Truck

NEW FEATURES have been added to the "Salsbury" lift type "Turret" truck, distributed by Nutting Truck and Caster Co., Fairbault, Minn. One of these is



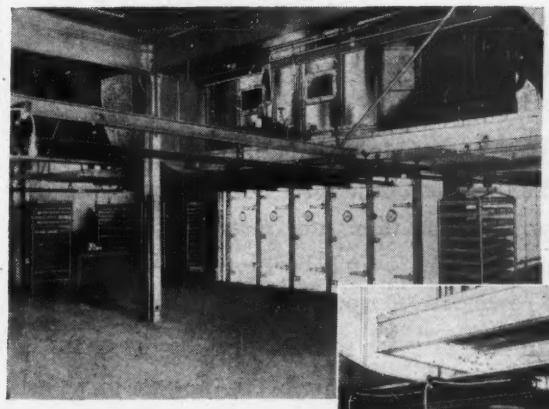
Turret type of lift truck

an easy-to-reach, hand-operated lift lever at the right of the driver's platform. Also, at the left of the platform is a load-wheel brake pedal that actuates internal expanding brakes on the two load wheels. Another new feature is a fully enclosed primary drive chain, requiring less frequent lubriation. The lift platform has been tapered to permit en-

THE best and surest way of eliminating delays in food processing is the removal of manual handling and rehandling. Let American MonoRail Overhead Handling Equipment do your handling and speed up your production by rapid, careful transfer from one operation to another.

American MonoRail Equipment is available for manual, automatic or electric operation. Standard parts fit quickly into complete systems to meet a wide variety of handling problems. Size of plant, nature of product, weight and load make little difference. An American MonoRail Engineer will gladly show the possibilities of producing more food faster and more economically. Write today.

THE AMERICAN MONORAIL CO.
13125 Athens Avenue — Cleveland 7, Ohio



MonoRail tracks bring racks into ovens without jolt or damage.

★

Compact switch arrangement allows free passage of racks into ovens.

Right at Home in any Company

IN some plants Towmotor is "the whole works" when it comes to materials handling. In others, the "one man gang" works in close conjunction with other types of handling equipment. But whatever the set up, Towmotor's ability to lift loads as heavy as 10,000 pounds . . . carry them as fast as 880 feet a minute . . . and stack them as high as 25 feet, means savings in time, money, manpower, and space.

Sooner or later it's going to be possible, practical and profitable for you to install a flexible, efficient materials handling system. Many of the questions you'll raise then are answered now in our new manual, "The Inside Story." We'll be glad to send you a free copy. Just write Towmotor Corporation, 1222 E. 152nd Street, Cleveland, Ohio.

Our "Lift Truck Operator's Guide" contains valuable information for all lift truck owners. Send for your free copy.

TOWMOTOR

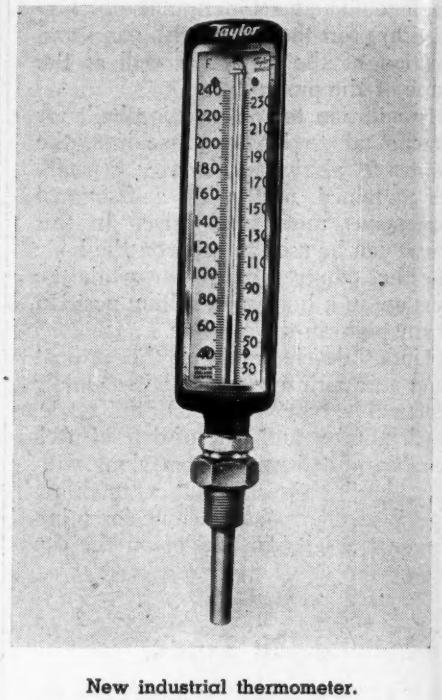
ARMY E NAVY

THE 24-HOUR ONE-MAN-GANG

trance to skids at an angle. The end rail of platform is higher and heavier, and is mounted in sockets for easy removal.

Industrial Thermometer

TAYLOR INSTRUMENT COMPANIES, Rochester, N. Y., has brought out an industrial thermometer designed to save on use of critical materials. In this design, the one-piece case has been made shallower so that the mercury column can be seen through a wider angle of vision. The construction has been improved to give a dust-proof, rattle-proof and fume-proof thermometer, that can withstand vibration and severe shock.

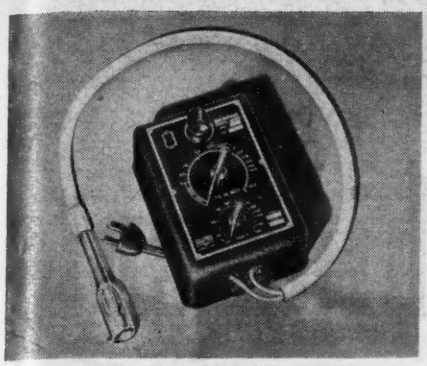


New industrial thermometer.

The new instruments are equipped with the easy reading Binoc tubing. They are furnished in many combinations of straight and angle stems, threaded for easy connection and in any standard temperature ranges within the limits of −40 deg. F. to +750 deg. F. Standard scale lengths are 7 and 9 in. The numerals have been made bold and clear for easy reading against a contrasting background.

Water Purity Meter

AN INSTRUMENT that provides a practical and quick way to check the purity of distilled water has been introduced by Barnstead Still & Sterilizer Co., Forest Hills, Boston, Mass. In use, the temperature of the distilled water is first determined. Next, a dial on the "purity" meter is set to the corresponding temperature. Then, with the conduc-



Meter for testing the impurity of distilled water.

tivity cell immersed in the distilled water, a dial is moved until the electric radio eye is at the correct setting. At this point, the dial indicates the impurity content of the distilled water in terms of parts per million as sodium chloride. The whole procedure takes but a very short time and gives a quick check against a predetermined standard.

This meter is in effect a compact conductivity bridge. Dimensions are $6\frac{3}{4}$ x 5 x $2\frac{3}{8}$ in. and weight is $3\frac{1}{4}$ lb. In operation, the meter requires no batteries, being connected to a 110-volt, 60 cycle outlet. Measurement scale reads from 0 to 15 parts per million as sodium chloride. Temperature correction scale is 64 to 190 deg. F.

Vertical Motors

General Electric Co., Schenectady, N. Y., has brought out a new line of G-E vertical motors, ranging from 40 to 200 hp. at 1750 r.p.m. and in equivalent ratings at other speeds. These new motors, which are furnished for both constant and adjustable speeds, are designed for low thrust, solid shaft application on pumps and other equipment. They are also desirable for use in cases where floor space must be conserved or the expense of gearing avoided.

Motors are of drip-proof, protected construction, providing complete protection from dripping liquids and falling objects. Both upper and lower bearings are provided with fittings for lubrication, and provision for the escape of excess grease reduces the possibility of overlubrication. A special bearing housing prevents grease from entering the motor and damaging the commutator and the windings. The roomy cast iron conduit box can be arranged for leads at the top, bottom or sides. Two hand-hole covers, removable without the use of tools, are provided to permit quick and easy inspection of the commutator end brushes. The ring-type base has an accurately machined rabbet and jig-drilled mounting holes, assuring perfect alignment with the driven machine. Lifting lugs are provided for handling.

Food is VITAL!

Reduce waste with *Beckman* pH Control

WHEREVER pH *(alkalinity or acidity)* affects the quality and uniformity of food processes, Beckman pH control can yield important savings by insuring better pack, consistent high quality and reduced spoilage. For example . . .

pH APPLICATIONS

BAKING
BOTTLE WASHING
BREWING
CANNING
CARBONATED BEVERAGES
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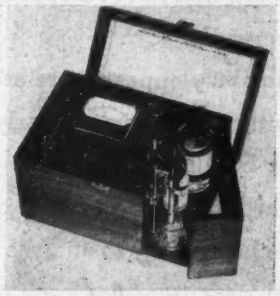
Canning processes can be accomplished with greater speed, safety and reduced vitamin loss if close pH control is maintained. In the canning of meat, for example, it takes 60 minutes at 100° C to kill anaerobic bacteria when the pH is 7.2 . . . 15 minutes at pH 6.0 . . . and only 3 minutes at pH 5.5.* In addition, vitamins in general withstand heat better in moderately acid conditions than in alkaline solutions.

Therefore, by accurately maintaining the pH at the optimum value, canning processes can be accomplished safely and more quickly, reducing harmful effects of excessive heat . . . and with minimum loss of vitamin content.

* Glaske—Z. Fleisch u. Milchhyg; V. 49; p. 310



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JUST OFF THE PRESS

BOOKLETS • LITERATURE • BULLETINS

FOOD PLANT EQUIPMENT

Dehydrating Equipment—"The Proctor Conveyor Dehydrator" is the title of an 18-page catalog giving a complete photographic picture of a continuous vegetable dehydrating system from the raw, unprepared vegetable to its final packaging for shipment, published by Proctor & Schwartz, Inc., 7th St. & Tabor Road, Philadelphia, Pa.

Electric Trucks—Typical installations, mechanical and electrical features, and specifications of low- and high-lift electric industrial trucks are described in the 32-page illustrated catalog, No. 6, entitled "Low and High Lift Platform Trucks," published by Wright Hibbard Industrial Electric Truck Co., Inc., Phelps, N. Y.

Materials Handling Equipment—A brief 4-page folder illustrating the "Styl-O-Matic Straightline Unscrambling Table," for unloading any size bottle, jar or container, has been issued by Island Equipment Co., Inc., 101 Park Ave., New York.

Mixing Equipment—A capacity table, diagrams and pictures of horizontal mixers, jacketed cooking kettles and holding tanks used in mixing and blending dry products such as feeds, self-raising flours, tooth paste and rubber fillers, are given in a 4-page folder, "Edge Moor Horizontal Mixers & Blenders," by Edge Moor Iron Works, Edge Moor, Del.

Equipment Fabrication—Pictures of typical installations in such industries as packing, sugar mills, foods, acid works and rubber plants where corrosion, temperature and pressure conditions exist, are found in the 4-page folder, Bulletin 116, entitled, "Process Equipment Fabrication for Chemical Industries," put out by Edge Moor Iron Works, Inc., Edge Moor, Del.

PLANT SUPPLIES

Electric Brakes—Diagrams, operation details, advantages and three typical applications of the Magdraulic electric brake, are given in a 6-page pamphlet put out by Empire Electric Brake Co., South 14 St., Newark, N. J.

Flexible Tubing—Complete data on flexible tubing for liquid and gas pipelines is given in the 36-page illustrated catalog No. 113 issued by Titeflex Metal Hose Co., 500 Frelinghuysen Ave., Newark, N. J.

Heating Equipment—Bulletin 508, a 4-page booklet concisely describing and illustrating "Lumm Panel Connectors" used in assembling nonmetallic ducts for heating and ventilation is published by Dravo Corp., Heater Department, 300 Penn Ave., Pittsburgh, Pa.

Leather Belting—The proper selection, correct installation and maintenance of leather belts, methods for aligning shafting and pulleys and Federal specifications for belts and belting, are given in a 20-page booklet "Leather Belting Conservation and Other Engineering Data," issued by Baldwin Belting & Leather Co., Inc., 85 Chambers St., New York.

Motors—Construction details and photographs of "Century Squirrel Cage Induction Polyphase Motors," from $\frac{1}{6}$ to 600 hp., are given in a 16-page illustrated booklet, Form 344A, published by Century Electric Co., 1806 Pine St., St. Louis, Mo.

Motors—Photographs, advantages and descriptions of the mechanical features of gear motors and electrical characteristics of polyphase motors are found in the 16-page illustrated bulletin, GEA–1437D, issued by General Electric Co., Schenectady, N. Y.

Piping—"If It's Piping, Contact Flori," is the title of a 64-page catalog illustrating through photographs various ways in which piping can be used, and giving market prices for all kinds and sizes of fabricated piping, published by Flori Pipe Co., Red Bud & Bulwer Aves., St. Louis, Mo.

Pump Maintenance—A chart printed in two colors on heavy bristol board and punched at the top for hanging, illustrating ten ways to make rotary pumps last longer for the duration, has been issued by Blackmer Pump Co., 1703 Century Ave., Grand Rapids, Mich.

Rotary Pumps—For the benefit of those who operate rotary pumps, the April-May, 1943, issue of "The Blackmer Swinging Vane," describes various installations of rotary pumps, to be used with such equipment as auxiliary fire-fighting equipment, or in bottling and power plants; issued by Blackmer Pump Co., 1700 Century Ave., Grand Rapids, Mich.

Rubber Gloves—A 4-page Catalog Section 9035, describing how the Anode process acid and industrial rubber gloves are constructed and illustrating the types and uses of various gloves, has been issued by B. F. Goodrich Co., Akron, Ohio.

Steam Separators—"Separating Oil From Steam," is the title of a reprint of an article by W. C. Bennett illustrating a typical installation of a receiver-separator, and giving a chart for separator selection; issued by Cochrane Corp., 17th & Allegheny Ave., Philadelphia, 32, Pa.

Valves—A reprint of an article by William C. Bennett entitled, "New Sizing Data on Relief Valves," explains the various factors that determine valve size, and give data to show how size and pressure drop affect capacity; published by Cochrane Corp., 17th & Allegheny Ave., Philadelphia, 32, Pa.

PACKAGING

Adhesives—Various kinds of adhesives for carton and case sealing, can and bottle labeling, and wrapping are briefly described in a 4-page folder entitled "Top Quality Adhesives for Every Purpose," put out by Paisley Products, Inc., 1770 Canalport Ave., Chicago.

Labeling—"Helpful Hints for Label Users," a 4-page folder describing methods of designing, printing and trimming labels, has been published by Burt Machine Co., Baltimore, Md.

Packaging Equipment—A folder illustrating "Filma-Seal," an inert innerseal supplied with all standard Gutmann screw-cap sizes, has been issued by Ferdinand Gutmann & Co., 36th to 37th St. & 14th Ave., Brooklyn.

MISCELLANEOUS

Electronics—"Electronics at Work," a 42-page catalog, B-3264, illustrating various electronic applications in industry such as air-borne dust particles, motor control, and destroying bacteria and mold by means of ultraviolet radiation, is published by Westinghouse Electric & Manufacturing Co., Department 7-N-20, East Pittsburgh, Pa.

Feed Water Treatment—"Operation of Hot Process Softener at 50 Lb. Gage Improves Performance and Saves Chemicals," is the title of an article by C. E. Joos and Frank Kemmer, illustrating the effectiveness of high temperatures in reducing water hardness with lime and soda ash treatment, issued as Reprint No. 25 by Cochrane Corp., 17th & Allegheny Ave., Philadelphia, Pa.

Protective Coatings—Technical, metal, industrial and high heat coatings to meet wartime requirements are described in the 27-page catalog, "Corrosion Can Be Controlled," published by Protective Coatings, Inc., P. O. Box 56, Strathmoor Station, Detroit, Mich.

Pump Test Code—A revised edition of the "Test Code Section" of its standards, containing specific recommendations for testing centrifugal and rotary pumps, has been issued by Hydraulic Institute, 90 West St., New York, at 50 cents a copy, payable in advance.

BOOKS

Reducing Absenteeism

CONTROLLING ABSENTEEISM. Published by the U. S. Department of Labor, 1943. 57 pages; 6x9 in.; paper. Price 10 cents; for sale by Superintendent of Documents, Washington, D. C.

To aid in combatting the wartime problem of absenteeism in factories, the government has set forth in this pamphlet the experiences of management in dealing with the problem in 200 outstanding war plants. Several practical methods for discouraging employees from staying off the job are discussed, and evaluations of the various methods are given by executives.

Accident Prevention

FOREMANSHIP AND ACCIDENT PREVENTION IN INDUSTRY. Published by Engineering Department, American Mutual Liability Insurance Co., Boston, Mass., 1943. 94 pages; 5x7¼ in.; cloth. Free.

This publication was written primarily to teach the foremen in industry safety precautions. Reducing the number of accidents is important in maintaining wartime production schedules as well as reducing human suffering. How to increase safety through the supervision of department foremen is stressed throughout this book.

The difference between injuries and accidents, causes of accidents, the extent to which accidents can be prevented, maintenance of equipment and aids to the foremen are some of the topics covered here. The chapter devoted to women workers is particularly timely.

Dehydrating Foods

DRYING AND DEYDRATION OF FOODS. By Harry W. von Loesecke. Published by Reinhold Publishing Corp., 330 West 42nd St., New York, N. Y., 1943. 302 pages; 6¼x9¼ in.; cloth. Price, $4.25

Dozens of articles, papers and pamphlets have been published since Pearl Harbor on the war-inspired developments in food dehydration. But this is the first book, and its greatest value lies in the fact that it brings together in one volume a fairly complete picture of food drying and dehydration as it stood when the book was written. Much is yet to be learned, and new facts are being discovered continuously, so the volume cannot be taken as the final word.

The author discusses the engineering, technology and cost phases of dehydration, as well as packaging, storage, compression, methods of analysis and reconstitution. He also gives a partial list of patents pertaining to the dehydration of foods.

To keep the book within reasonable limits of length, the discussion of each subject is brief—too brief in many instances for engineers and technologists in the commercial dehydration industry. Many references to other sources of information help, however, to broaden the scope of the treatment. All in all, the book would be profitable reading for anyone engaged in dehydration, although it might not answer his specific problems.

Microscopes Explained

THE MICROSCOPE AND ITS USE. By F. J. Munoz and H. A. Charipper. Published by Chemical Publishing Co., 234 King St., Brooklyn, N. Y., 1943. 334 pages; 6x9 in.; cloth. Price, $2.50.

Two factors give this book particular value. One is the extensive use of the microscope in food research and quality control work. The other is the dearth of literature other than manufacturers catalogs which explains the various types of microscopes, the different technics that may be employed and the mistakes that may be made in handling the instrument.

Written in nontechnical language and illustrated, the book is of value to those who wish to learn how to use microscopes as well as to technologists who have had experience with the instrument but who sometimes encounter difficulties in obtaining the desired results. Of particular value to the latter is a list of 36 common errors made in the use of simple and compound microscopes, with a brief discussion of each.

Nutrition in Industry

MANUAL OF INDUSTRIAL NUTRITION. Published by Nutrition in Industry Division, Nutrition and Food Conservation Branch, Food Distribution Administration, Washington, D. C., 1943. 25 pages; 5¾x9 in.; paper. Free.

This is the first of a series of short pamphlets written primarily to promote a nationwide nutrition program in industry. Several of the chapters contain practical suggestions to bring about higher standards of working efficiency in the plant through better eating facilities, educational programs for the workers and the serving of more nutritionally balanced foods. A few examples of the types of meals that are both nourishing and practical for mass feeding are also included.

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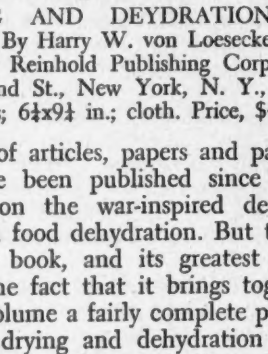

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PATENTS

Yeast Food in Dry Solid Form Stabilized Against Deterioration of Halogenate Salt Constituent—Lloyd A. Hall, to Griffith Laboratories, Inc., Chicago, Ill. No. 2,321,673. June 15, 1943.

Milk Freed From Suspended Solids by Double Filtering in Single Unit—Henry Schriever, Douglas, Minn. No. 2,321,776. June 15, 1943.

Nuts Cracked in Machine Containing Conical Disk Revolving in Adjustable Relation to Stationary Face-plate Provided With Pressure Roller—Herbert S. Buckman, Seattle, Wash. No. 2,321,795. June 15, 1943.

Ground Coffee Mechanically Mixed and Discharged in Measured Quantities to Packer From Collector Bin Through Rotatable Valve—Douglas M. McBean, Rochester, N. Y., to Beech-Nut Packing Co., Canajoharie, N. Y. No. 2,321,838. June 15, 1943.

Dehydrater of Tunnel Type Designed to Handle Row of Open-ended Stacked Drying Trays—Earle L. Roberts, Modesto, Calif. No. 2,321,858. June 15, 1943.

Eggs in Shell Tested for Presence of Blood by Use of Radiant Energy Waves From Light Source to Responsive Electric Circuit—William D. Dooley, Springfield, Ohio. Nos. 2,321,899 and 2,321,900. June 15, 1943.

Fish Oils Freed From Objectionable Odors and Flavors by Catalytic Hydrogenation Under Controlled Temperature and Pressure in Presence of Activated Carbon—Douglas J. Hennessy, Teaneck, N. J., to Vitamoil Laboratory, Inc. No. 2,321,913. June 15, 1943.

Cheddar Cheese Made by Use of Lipolytic Enzyme Obtained From Mammary Tissue—Clarence B. Lane and Bernard W. Hammer, to Iowa State College Research Foundation, Ames, Iowa. No. 2,322,148. June 15, 1943.

Foaming of Fatty Material During Hydrogenation in Presence of Nickel Catalyst Inhibited by Addition of Phosphoric Acid—Howard C. Black, to Industrial Patents Corp., Chicago, Ill. No. 2,322,186. June 15, 1943.

Foaming During Deep Fat Frying Avoided by Addition of Small Quantity of Nontoxic, Water-soluble, Oil-soluble Salt of Organic Acid Containing Oxygen—Howard C. Black, to Industrial Patents Corp., Chicago, Ill. No. 2,322,187. June 15, 1943.

Fruits Inspected and Trimmed While Conveyed on Table Operating on Predetermined Stop-and-go Cycle—Bruce L. Flemming, Lahania, Hawaii, to Baldwin Packers, Ltd. No. 2,322,190. June 15, 1943.

Cheese Coated With Composition Consisting of Petroleum Wax With Melting Point 126 to 128 Deg. F., Amorphous Petroleum Wax with Melting Point of 145 Deg. F. and Amorphous Petroleum Wax With Melting Point 160 to 165 Deg. F. Containing 5 to 20 Percent of Glyceride Ester—Clinton H. Parsons, to Industrial Patents Corp., Chicago, Ill. No. 2,322,198. June 15, 1943.

Meat in Loaf-like Units Pressure Boiled in Compartment Pan—Sayle Edgar Smith, Elmhurst, Long Island, N. Y., and Charles L. Straeten, Chicago, Ill., to Industrial Patents Corp., Chicago, Ill. No. 2,322,199. June 15, 1943.

Meat Tenderized by Mechanical Treatment—Leonard A. Larson, Chicago, Ill., and Leo W. Hart, Milwaukee, Wis., to Kwik Steak Machine Co. of America, Milwaukee, Wis. No. 2,322,243. June 22, 1943.

Water Solution of Gelatinous Material Made to Contain Thiamine in Amounts Exceeding Gelatinous Constituent—Lawrence Atkin and Alfred S. Schultz, Bronx, and Charles N. Frey, Scarsdale, N. Y., to Standard Brands, Inc., New York, N. Y. No. 2,322,270. June 22, 1943.

Yeast Growth During Propagation Stimulated by Vitamin B^6 Content of Nutrient Medium—Robert E. Eakin and Roger J. Williams, Corvallis, Ore., to Standard Brands, Inc., New York, N. Y. No. 2,322,287. June 22, 1943.

Vitamin B_6 Added to Yeast-growing Wort Deficient in Growth-promoting Factors—Alfred S. Schultz and Lawrence Atkin, Bronx, and Charles N. Frey, Scarsdale, N. Y., to Standard Brands, Inc., New York, N. Y. No. 2,322,320. June 22, 1943.

Corn Steeped for Starch Production in Two Steps With Sulphur Dioxide Added to First Step Steep Water and Germicide, Benzoate of Soda and Benzoic Acid, Added to Second Step Steep Water to Control Enzymic and Bacterial Activity—J. Paul Bishop, Clarendon Hills, and William Foley Henry, Argo, Ill., to Corn Products Refining Co., New York, N. Y. No. 2,322,413. June 22, 1943.

Celery and Similar Vegetables Washed During Movement Through Water Spray on Conveyor—Jack Christian, Sanford, Fla. No. 2,322,417. June 22, 1943.

Sucker-type Confections Wrapped in Flexible Heat-sealing Material by Mechanical Means—Joseph William Fay, Villa Park, Ill., to Overland Candy Corp., Chicago, Ill. No. 2, 322,430. June 22, 1943.

Sausage Casings Closed With Independent Cord Tie—Henry A. Hensel, Milwaukee, Wis. No. 2,322,447. June 22, 1943.

Corn Zein Cured by Treatment With Solution of Aldehyde and Acid in Presence of Substituted Ammonia to Accelerate Reaction—Lloyd C. Swallen, Villa Park, Ill., and Albert L. James, Tenafly, N. J., to Corn Products Refining Co., New York, N. Y. No. 2,322,486. June 22, 1943.

Leafy Vegetables Packed in Fibrous Sheet Containing Unstable Sulpho Compound in Quantities Not Less Than 1½ Percent SO_2 on Sheet-weight Basis—William H. Wilson, to Fruit & Vegetable Processing Co., Santa Monica, Calif.

Undesirable Substances in Skin and Germ of Soybeans Fixed by Treatment With Iron, Calcium or Magnesium Salt to Prevent Absorption by Bean Cotyledon During Heat Treatment—Artemy Alexis Horvath, to Horvath Laboratories, Inc., Chambersburg, Pa. No. 2,322,516. June 22, 1943.

Non-potable Water Containing Sodium and Magnesium Chlorides Made Potable by Treatment With Silver Agent for Precipitation of Chlorine and Magnesium—Alexander Goetz, Pasadena, Calif., to Sunshine Mining Co., Yakima, Wash. No. 2,322,689. June 22, 1943.

Canned Milk Agitated Continuously During Predetermined Period of Pre-heating, During Predetermined Cooking Period, and During Cooling With Intervening Time at Increased Cooking Temperature Without Agitation—Alex R. Kennedy, by Harriett M. Kennedy, Executrix, to Indiana Condensed Milk Co., Indianapolis, Ind. No. 2,322,693. June 22, 1943.

Milk Spray Flash Sterilized by Previously Unheated Chlorine Gas Which is Kept Out of Contact With Bulk Body of Milk in Collector—Herbert T. Stiles, Suffield, Conn. No. 2,322,721. June 22, 1943.

Monosaccharide Treated With Alkaline Bisulphite to Give Plasticizer for Animal and Vegetable Glues—Nathan R. Pike, New Rochelle, N. Y., Paul H. Kelm, Fort Lee, and George A. McLaren, Jr., West Englewood, N. J., to Applied Sugar Laboratories, Inc., New York, N. Y. No. 2,322,736. June 22, 1943.

Malted Liquid Cooked to Give Wort Substantially Free From Precipitable Proteins When Fermented—John F. Silhavy, Chicago, Ill. No. 2,322,749. June 29, 1943.

Fruit and Vegetable Juices Extracted in Expeller-type Press—William de Back, to Chisholm-Ryder Co., Inc., Niagara Falls, N. Y. No. 2,322,791. June 29, 1943.

Vegetables Preserved by Pickling in Solutions Containing Small Quantities of Organic Acids and Phytin Obtained as Waste Products From Cornstarch Steep Water, Potato Starch Press Water and Distillery Spent Grain Wash—Alfred Pollak, New York, N. Y. No. 2,322,880. June 29, 1943.

Dry Sour Mix Made to Contain Acid-forming Bacteria, Cereal and Legume Flours, and Moisture Content Not Exceeding 6 Percent—George William Kirby, Yonkers, Marvin Helmar Rasmusson, Brooklyn, and Stanley Adolphus McHugh, Bronx, N. Y., to Standard Brands, Inc., New York, N. Y. No. 2,322,940. June 29, 1943.

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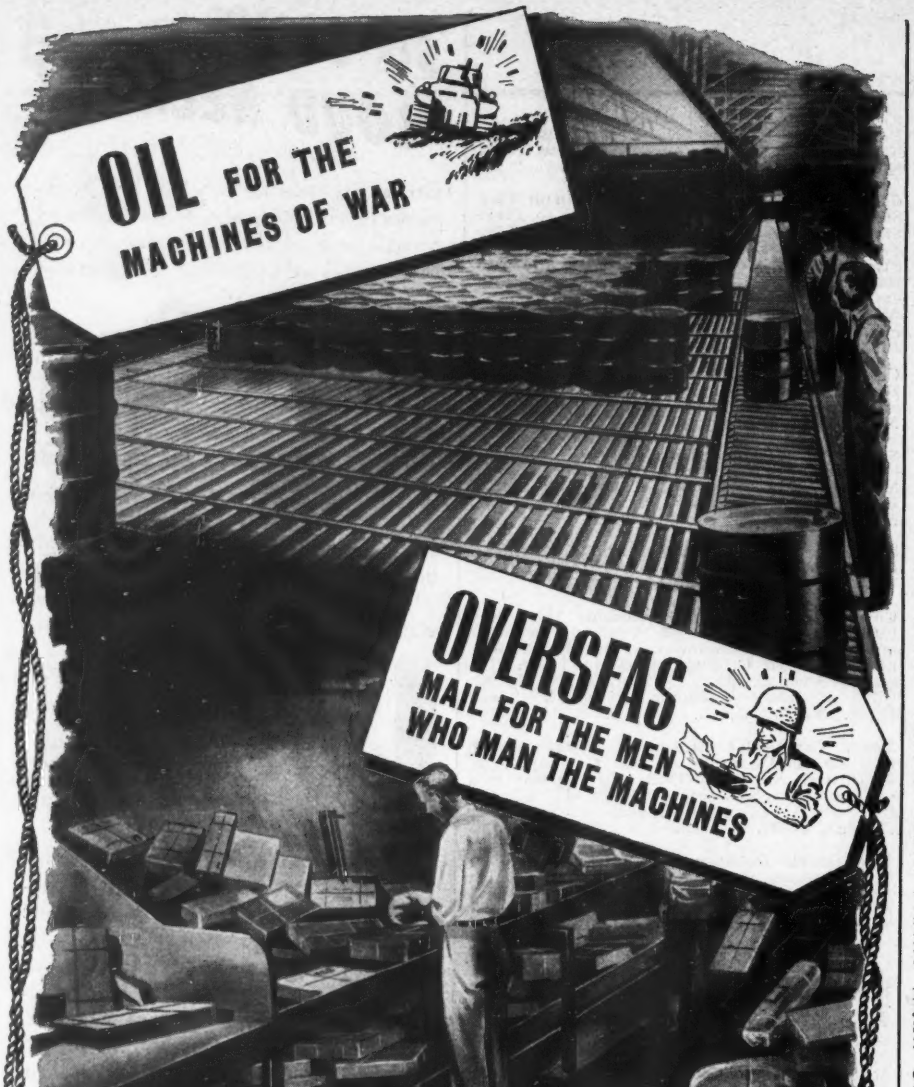

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Sugar-containing Liquid Obtained by Acid Hydrolysis and Saccharifying of Wood Meal—Demetrio Ferrari and Mario Torresi, Rome, Italy, to Alien Property Custodian. No. 2,323,022. June 29, 1943.

Milk Packaged in Container Constructed to Permit Cream Separation During Pouring—Ezekiel Hanson, San Diego, Calif. No. 2,323,036. June 29, 1943.

Starch Separated From Corn Gluten by Centrifuging Milk Obtained by Removal of Germ and Coarse Slop From Ground Steeped Corn—Albert Peltzer, to Merco Centrifugal Co., San Francisco, Calif. No. 2,323,077. June 29, 1943.

Green Corn Cut From Cobs by Plurality of Knives Operating Under Spring Control—Charles E. Kerr, Hoopeston, Ill., to Food Machinery Corp., San Jose, Calif. No. 2,323,092. June 29, 1943.

Foods Processed in Oxygen-free System Provided With Mechanism for Removing Floatable Waste Solids Without Clogging—Ronald B. McKinnis, to McKinnis Foods, Winter Haven, Fla. No. 2,323,147. June 29, 1943.

Animal Protein Containing Not More Than 3 Percent Fat Used as Carrier for Spice-seasoning Extracts—Carrol L. Griffith, to Griffith Laboratories, Inc., Chicago, Ill. No. 2,323,466. July 6, 1943.

Pectin Recovered From Pectin Complex by Ion Exchange—Phillip B. Myers and Alvin H. Rouse, McAllen, Tex., to Sardik, Inc., New York, N. Y. No. 2,323,483. July 6, 1943.

Butter Fat Formed and Imprinted by Manually Operated Mechanical Device—Henry H. Doering and Bert J. Skoglund, to Charles Doering and Henry H. Doering, Chicago, Ill. No. 2,323,523. July 6, 1943.

Small Fruits Decapped and Destemmed by Mechanical Means—Arthur H. Morgan, Knoxville, Tenn. No. 2,323,668. July 6, 1943.

Vegetables Mechanically Sliced on Large Production Scale—Joseph Wolfinger, Sr., Dundas, Wis., deceased, Frank F. Wolfinger, administrator. No. 2,323,760. July 6, 1943.

Meat Tenderized by Mechanical Braizing—John Hansen, Bettendorf, Iowa, to U. S. Slicing Machine Co., La Porte, Ind. No. 2,323,769. July 6, 1943.

Coffee Beans Mechanically Cracked in Air Stream for Removal of Chaff With Means for Recovery of Coffee Particles Initially Carried Away With Chaff—Albert J. Hazle, Jr., to B. F. Gump Co., Chicago, Ill., No. 2,323,771. July 6, 1943.

Ice Cream Cones Packaged in Combined Shipping and Dispensing Container—Larry Pape and Murray Weintraub, to Milko Cone & Baking Co., Inc., Chicago, Ill. No. 2,323,841. July 6, 1943.

Pie Crust Rolled Into Desired Form by Motor Driven Mechanism—Lloyd J. Harriss, Kenilworth and Bernard Lambers, Oak Park, Ill., to Lloyd J. Harriss. No. 2,323,907. July 13, 1943.

Boned Meat Wrapped in Warm Caul Fat Preparatory to Quick Freezing—Beverly E. Williams and Leon L. Cadwell, to Industrial Patents Corp., Chicago, Ill. No. 2,323,953. July 13, 1943.

Fat-soluble Vitamin Concentrates of High Potency Recovered From Unsaponifiable Fraction of Marine Oil—Loran O. Buxton, to National Oil Products Co., Harrison, N. J. No. 2,324,063. July 13, 1943.

Dextrose Made to Have Higher Rate of Water Solubility Than Alpha Dextrose Monohydrate—Herman H. Schopmeyer, Hammond, Ind., and Wellbourne A. Mollison, Chicago, Ill., to American Maize-Products Co. No. 2,324,113. July 13, 1943.

Edible Cellulose Container for Food to be Cooked in Deep Fat—Samuel C. Cummings, Philadelphia, Pa. No. 2,324,137. July 13, 1943.

Meat Balls Formed in Continuous Mechanical Manner—Willard B. Felton, to Nuckolls Packing Co., Pueblo, Colo. No. 2,324,202. July 13, 1943.

Flour Bleached in Multi-step Manner—Charles G. Ferrari, Minneapolis, and Willis S. Hutchinson, St. Paul, Minn., to General Mills, Inc. No. 2,324,203. July 13, 1943.

Butter Formed and Sliced While Forced

Through Die—Charles L. Hayman and William M. Fountain, Oakland, Calif. No. 2,324,208. July 13, 1943.

Fruits Cleaned and Coated With Aqueous Gum-resin Emulsion—Gottlieb Wehrli, Basel, Switzerland. No. 2,324,448. July 13, 1943.

Freestone Fruits Pitted During Halving Operation—Eathel O. Burling, Yakima, Wash., to Pacific Machinery Co., San Francisco, Calif. No. 2,324,470. July 20, 1943.

Foods Frozen During Passage Through Refrigerated Zone Between Highly Flexible Conveyor Surfaces Against Which is Directed Refrigerated Liquid—David W. King, Knoxville, Tenn. No. 2,324,517. July 20, 1943.

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Milk Pasteurized in Combination Heat Exchanger and Pasteurizing Unit Equipped With Circulating Pump—Edward C. Damrow, to Damrow Brothers Co., Fond du Lac, Wis. No. 2,324,615. July 20, 1943.

Natural Cheese Made by Working With Curd and Whey in Compartmented Vat—Raymond Miollis, Elmwood Park, Ill. No. 2,324,636. July 20, 1943.

Dairy Cream Homogeneously Dispersed Into Grape Sirup to Give Palatable Unfermented Food Product—Antonio Perelli-Minetti, Delano, Calif. No. 2,324,639. July 20, 1943.

Bread Dough Mass Divided Into Underweight Pieces Which Are Subsequently Brought to Exact Weight by Mechanical Means—Barton Dell Baker, Laurence Seymour Harber and John Edward Pointon, Peterborough, England. No. 2,324,667. July 20, 1943.

Large, Readily Washable Crystals of Riboflavin Recovered From Crude Material—Richard Pasternack, Brooklyn, and Ellis V. Brown, Cold Spring Harbor, N. Y., to Charles Pfizer & Co., Brooklyn, N. Y. No. 2,324,800. July 20, 1943.

Starch Milk From Germ and Coarse Slop Separations Subjected to Centrifuging Operation for Removal of Corn Gluten and Fine Slop—Alfred H. Kelling, Chicago, Ill., to Corn Products Refining Co., New York, N. Y. No. 2,324,849. July 20, 1943.

Corn Starch Separated From Germ by Series of Centrifuging Operations With Subsequent Recovery of Wash Water and Water From Gluten Settling for Reuse in Steeping Operation—Alfred H. Kelling, Oak Park, Ill., to Corn Products Refining Co., New York, N. Y. No. 2,324,850. July 20, 1943.

Canadian Patents

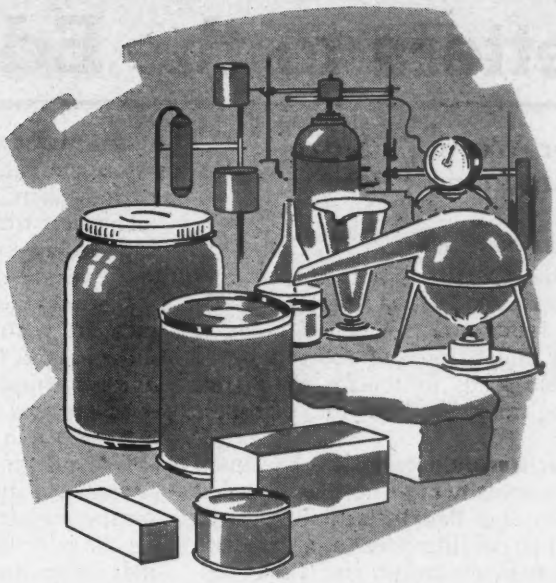
Ice Cream Packaged in Elongated Cylindrical Paper Container Closed Along Side Seam by Overlapping of Paper Edges—Russell Stover, Kansas City, Mo. No. 413,160. June 15, 1943.

Glyceride Oils Refined by Centrifugal Separation of Foots and Soap Stock—Benjamin Clayton, Houston, Tex., and Benjamin H. Thurman, Bronxville, N. Y. No. 413,271. June 22, 1943.

Glyceride Oils Stabilized by Heating to 120 Deg. C. in Presence of Small Quantity of Sugar and Phospholipin—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 413,378. June 22, 1943.

Pickles in Brine Packaged in Heat-sealing Transparent Rubber Hydrochloride Container—Paul M. Gilfillan and Irving Gurwick, to Shellmar Products Co., Mount Vernon, Ohio. No. 413,388. June 22, 1943.

Beverages Packaged in Metal Container Made From Sheet Iron Coated Continuously With Polyamide That Permits Seamless Closing and Crimping Without Exposure of Metal Surface to Contents of Container—Wallace Hume Carothers, Wilmington, Del., deceased, to Canadian Industries, Ltd., Montreal, Quebec, by Wilmington Trust Co. No. 413,503. June 29, 1943.



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Letters to the Editor

Better Ways To Make Nonsettling Juices

To the Editor
of FOOD INDUSTRIES:

In the Questions and Answers column on page 133, of the July, 1943, FOOD INDUSTRIES you advise using a colloid mill to prevent the settling of insoluble solids in tomato juice after bottling and filtration for pineapple juice.

Some tomato juice packers have used homogenizers to break up the suspended particles and thereby help to prevent separation of the tomato fibers from the clear liquor and to give a finer texture preferred by their trade. To our knowledge such methods are not used on citrus juices, at least, not to any appreciable extent.

Investigational work done by various organizations and experience gained by the industry in recent years have indicated that the fundamental answer to the problem of the prevention of separation is a thermal treatment to inactivate the pectin-methoxylase and possibly other enzymes normally present in these fruits. The pectin in its normal state will hold the solids in suspension but, if demethoxylated by enzyme action, it loses this property.

The heat treatment must be applied very quickly after expressing the juice, as the pectin-destroying enzymes rapidly attack the pectin when the cell walls are ruptured during preparation of the juice. Z. I. Kertesz has found that, at room temperature, demethoxylation of cold-pressed juice from ripe tomatoes is complete in four minutes. He also has found that the enzyme activity (demethoxylation) on the pectin in tomatoes is completely stopped by heating the juice to 176 deg. F. for 45 seconds or to lower temperatures for increased lengths of time. These observations explain the success of the "hot break" method for maintaining the "body" in tomato juice. The extraction methods for tomato juice lend themselves to the use of preheated prepared tomatoes and thereby permit the use of sufficient heat on the chopped fruit to destroy the enzyme activity before rupturing of the cells by the juice extractor brings the enzyme into contact with the pectin.

Preheating or "hot breaking" is not applicable to the citrus fruits because of the different requirements for peeling and juicing as compared to tomatoes. However, rapid handling of the extracted juices and the use of sufficient heat to destroy the enzymes immediately has overcome the objectionable settling of solids and curdling or separation of colloidal matter and insoluble pectic acid which results from the degradation of the pectin. Both the time and temperature of heating must be considered in inactivating the pectin-destroying enzymes. Minimum temperatures from 190 deg. F. for flash sterilization, with a 1½ minute hold in the can before cooling, to pasteurization in the can at 180 deg. F., with a 15-minute hold, have been used successfully for grapefruit juice with no evidence of curd formation or abnormal separation of the insoluble solids after one year's storage. Thus, the exact treatment used for citrus fruits is determined by the equipment available and the general layout of the plant.—R. H. LUECK, *Director of Research, American Can Co., Maywood, Ill.; By Randall Royce.*

"Food Industries" is glad to be better informed regarding the production of nonsettling juices.—THE EDITORS.

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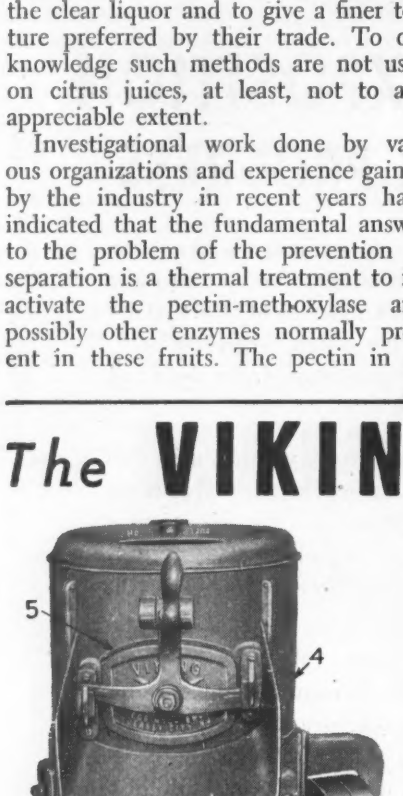

White Potatoes — Horseradish
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Carrots and Beets — Turnips and Yams

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Peels and washes—and drains peelings—all in one operation; belt or motor driven.

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Waste reduced to absolute minimum—and recoverable for cattle feed. Most economical in first cost, operation, maintenance and space.

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Our Error

To the Editor
of FOOD INDUSTRIES:

In the July, 1943, issue of FOOD INDUSTRIES, page 76, under the heading "Directory of Egg Drying Plants," we note the following:

"Marquette Food Products Co., Chicago, Ill.,—2 spray—Douthitt Corp."

The above is not correct. We designed the complete plant, buildings, processing scheme, egg-breaking equipment, spray drying, separate cooling systems for shell eggs, egg meat and egg powder, etc. New and, we believe, improved methods of various processing cycles were used in this three-story-and-basement plant.

Furthermore, the Marquette Food Industries, not Food Products, plant was designed by Leichenko and Esser, Inc., 225 N. Michigan Ave., Chicago, and built under their supervision. The spray dryers were built and installed by the H. S. Kaiser Co., 2411 Clybourn St., Chicago, Ill.—*Leichenko and Esser, Inc., Architects and Engineers, Chicago, Ill.*

We appreciate having this information about the Marquette plant and regret that the "Directory of Egg Drying Plants" was in error.—THE EDITORS.

Questions & Answers

Use of Thiocarbamide

Pennsylvania—"*We have noted several references to the use of thiocarbamide, which is sold under the trade name of 'Frulite' and developed under the U. S. patent by the Boyce-Tompson Institute. We understand that this material helps to maintain the original color without changing the flavor of cut or sliced fruit for some time after preparation. What is the present status of this product? Has the Food and Drug Administration made any definite statements regarding the use of such material?*"

As far as we know, the Food and Drug Administration has not yet ruled on the use of thiocarbamide. This was discussed with Dr. Paul B. Dunbar in Washington some four or five years ago, and he took the stand that until somebody produced a lot of scientific evidence that was incontrovertible, the attitude of the Food and Drug Administration would have to be negative. He said that they were not hostile, but they had an obligation to Congress and the public. It was up to the exploiters of this material to adduce the necessary evidence.

You would be wise in writing to Dr. Dunbar, U. S. Food and Drug Administration, Washington, D. C., for a definite ruling, if any such exists.

Food Technology Courses

New York—"*Are there any courses offered on food technology or food processing by institutions in New York City?*"

Courses in food technology are among those offered under the government war training program. Technical courses, at the college level, are offered by participating schools under the direction of the Engineering, Science and Management War Training Offices, of which there are 21 covering the various training regions of the United States.

The New York office, at 342 Madison Avenue, announces that it is now expected that there will be three courses in food technology in that region this fall, two at Manhattan College and one at New York University. Those proposed at Manhattan College are "Sanitation Problems in Food Handling and Processing" and "Technology of Food Manufacture." Information can be secured from Prof. C. J. Velz, School of Engineering, Spuyten Duyvil Parkway and 242nd St., New York City. The course at New York University is listed as "Principles of Food Dehydration." Inquiries about this should be addressed to Prof. M. C. Giannini, College of Engineering, University Heights, New York City.

Anyone interested should make inquiry as soon as possible, since a course is given only when there is a sufficient enrollment.

These courses are part of the program of training designed to enable men and women to change to jobs in war industries, by supplementing their previous training and experience. There are no fees. Only those students are admitted who meet the prerequisites for the course.

For courses in sections other than Long Island and lower New York State, information can be obtained from the office of the regional advisor for the district, whose name and address can be obtained by writing to the Director of the Engineering, Science and Management War Training Program, U. S. Office of Education, Washington, D. C.

In addition to the war training course, New York University is planning to offer a graduate course in food processing and technology, to students who meet the requirements for admittance to the Graduate School of Engineering. Information on this can be obtained from Dean Masson of the Graduate School of Engineering, N.Y.U.

Soybean Spread

Canada—"*We request information regarding soybean spread. The product in which we are interested is similar to peanut butter.*"

We are informed that soybean butter is a product of dubious quality. Soybeans roasted and then ground into a butter-like paste, similar to that from peanuts, have an undesirable texture and must be supplemented by some kind of fat or oil to give spreading quality. To avoid this, roasted peanuts in varying percentages are blended with the roasted soybeans. There is a lack of flavor and buttery consistency in ground roasted soybeans. Attempts are also being made to produce a marketable product by milling the roasted soybeans with dried fruit to produce a combination spread. Even this expedient seems to be in the doubtful category.

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Operates on the radio frequency impedance principle . . . calibrated against official Government oven methods. Sold on 10 day FREE TRIAL; no deposit; early shipments. Write for catalog.

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Production of Oil of Sage

(*Continued from page 82*)

used for flavoring all kinds of packed and canned goods, meats and especially sausages, replacing the bulkier and less uniform dried leaves.

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Package Testing Technic

(*Continued from page 69*)

paucity of basic data on the merits of materials for protective packaging. In order to force a stricter discipline in the use and evaluation of vapor-pressure difference as the driving force in permeability tests, the National Bureau of Standards has advocated that permeability data be reported on the basis of 1-mm. mercury column vapor-pressure difference.[4] This proposal has not met with the universal acceptance one might expect and, generally speaking, testing results are still reported too individualistically, although there is a general trend towards moisture-vapor transfer rate, MVTR, in g./24 hr./100 sq. in. in the vapometer system, which exposes one side of the sample membrane to air dried by $CaCl_2$ and the other side to air at 90 percent relative humidity, the system being held at 90 deg. F.

Inasmuch as uniformity in the reporting of fundamental properties of packaging materials is highly desirable, it is suggested that the industry follow the lead of the National Bureau of Standards and adopt a unified system of values. The writer would even go a step further than the Bureau of Stand-

ards, by proposing a name for the unit of permeability as well as its reciprocal, the moisture-vapor resistance. The property of a packaging material to resist the migration of water-vapor molecules allows a parallel with the phenomenon of electrical resistance to the migration of electrons. In both cases, this property depends upon the nature of the material itself, its physical dimensions, and state, as influenced by temperature. It cannot be measured directly, but must be measured indirectly, either by comparison with standard reference materials or else by determining the rate of migration. In the case of electrical conductors, we use the ohm as the unit of resistance and the reciprocal ohm (mho) for conductance.

It is suggested that we name the unit of water-vapor resistance the "Abrams" in honor of Allen Abrams, who is a recognized pioneer in the field of packaging research. It is further advocated that the unit of permeability be the reciprocal Abrams or Marbas and that it be defined as a moisture-vapor transfer rate of 1 g./24 hr./m.²/mm. Hg in the standard vapometer system and the term Kilo Abrams would, obviously, be 1,000 Abrams.

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Why Not Standardize?

(*Continued from page 61*)

Suppose we consider what would be the result if the electrically driven mechanical cake mixers had kept pace with the rapid development that war production has required of so many other things.

First, we would find less possibilities of variation in workmanship and more standardization. War has required allowance for only the most infinitesimal differences in workmanship. Each machine has to do the same identical job, and the same standard performance might be required of electrically driven mechanical cake mixers. While there could be permitted differences of machine design, mechanical or specially arranged emptying of the dough or batter features, and automatic shifting of speeds, timing of mixer action and stoppage upon completion, each mechanical cake mixer could be so standardized that it does the same job in exactly the same time.

To accomplish such standardization, a general standard beater size and de-

Break the Bottleneck of BATCH BLANCHING

In many dehydrating plants, the washing, peeling, cutting, etc., of vegetables is much faster than the batch blancher, and, in many cases, the batch blancher actually causes considerable unproductive waiting time for the dehydrating unit and for the inspecting and packing departments. In other words, if the blancher was as fast as other departments, many plants could produce more. This result can be secured by

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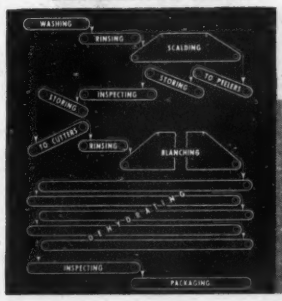

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sign and a standard bowl depth and diameter must be agreed upon and accepted by all manufacturers. Then, too, the manufacturers would have to decide upon and accept the most desirable peripheral speed per minute for each speed (first or low, second or medium, and so forth) that is designated. The diameter of a mixing bowl, the width of a beater and the number of revolutions that a beater makes with each center-crank turn (which is a periphery that the edge of the beater makes as it whirls around within the bowl when traveling through the dough in mixing) are units of definite importance when interpreting standard instructions as to time and speeds of mixing to obtain a definite mix and development of batter or dough. For example, consider a mixer "A" which, on first or low speed, has a center-crank or spindle speed of 38 r.p.m. This speed, multiplied by 2.26 beater turns for each revolution within the bowl and again multiplied by the periphery made by a beater 13½ in. wide, gives a peripheral speed of 3,645 in. per minute. That is the drag-through or travel of each edge of the beater in the dough or batter. Compare this peripheral speed with those of three other mixers operating on first or low speed, as listed in Table II, the mixers being designated as "B", "C" and "D".

Table II—Comparison of Peripheral Speeds.

	Mixer B	Mixer C	Mixer D
Center-crank speed	26 r.p.m.	45½ r.p.m.	29⅔ r.p.m.
Beater turns in bowl	3	2.36	3
Width of beater	14 in.	12½ in.	13 in.
Peripheral speed	3,435 in. per min.	4,574 in. per min.	3,775 in. per min.

Upon comparison of these speeds—3,435 in. per minute, 4,574 in. per minute and 3,775 in. per minute—it readily can be seen why there is such a lack of uniformity of results and why standardization should be decided upon, at least in work accomplishment.

It is suggested that the manufacturers of electrical mechanical cake mixers consider now, while the war is still on, why all their machines should not emerge from the wartime period with a standard work result—for example, a first or low peripheral speed of 4,300 in. per minute that could be obtained from 35 revolutions per minute of the center crankshaft, a beater turn of three times within the bowl for each revolution of the center crankshaft and a beater 13 in. wide. The work resulting from a peripheral speed of 4,300 in. per minute for the beater edge in the dough or batter would then be set as a standard. Similar uniformities should be established and put into practice to give a standardization of work results for all other speeds supplied.

This Is What It Costs To Dehydrate Vegetables

(*Continued from page 77*)

that overhead costs in vegetable dehydration depend on the length of the operating season, cost of buildings and equipment, local conditions and managerial policies. The complexity of these interrelated factors is such that no general estimates of overhead costs have been attempted.

The cost figures here presented are useful guides within the limits of the conditions set forth in the accompanying tables. Starting from these costs, a prospective operator can more easily calculate what his own costs are likely to be on the basis of the detailed data made available in his own plant by a segregation such as that indicated above. It is apparent from Table VII that the overall shrinkage ratio of a vegetable is the largest single factor in processing cost. With equal raw material prices, sweet potatoes, at 4½ to 1, have the lowest cost; and cabbage, at 19 to 1, the highest. Under conditions different from those assumed here for labor rates, shrinkage ratios, packaging and operating procedures, cost estimates must be adjusted correspondingly.

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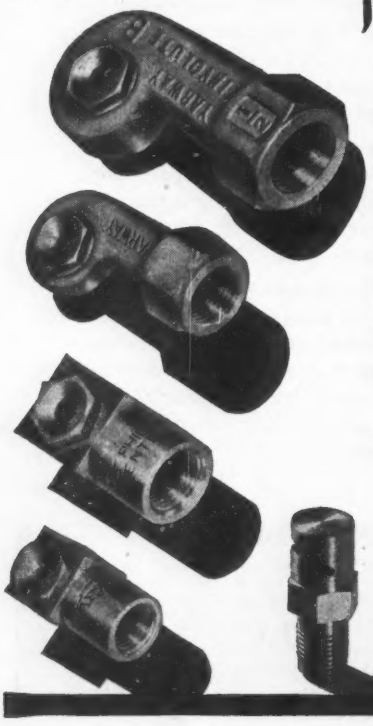

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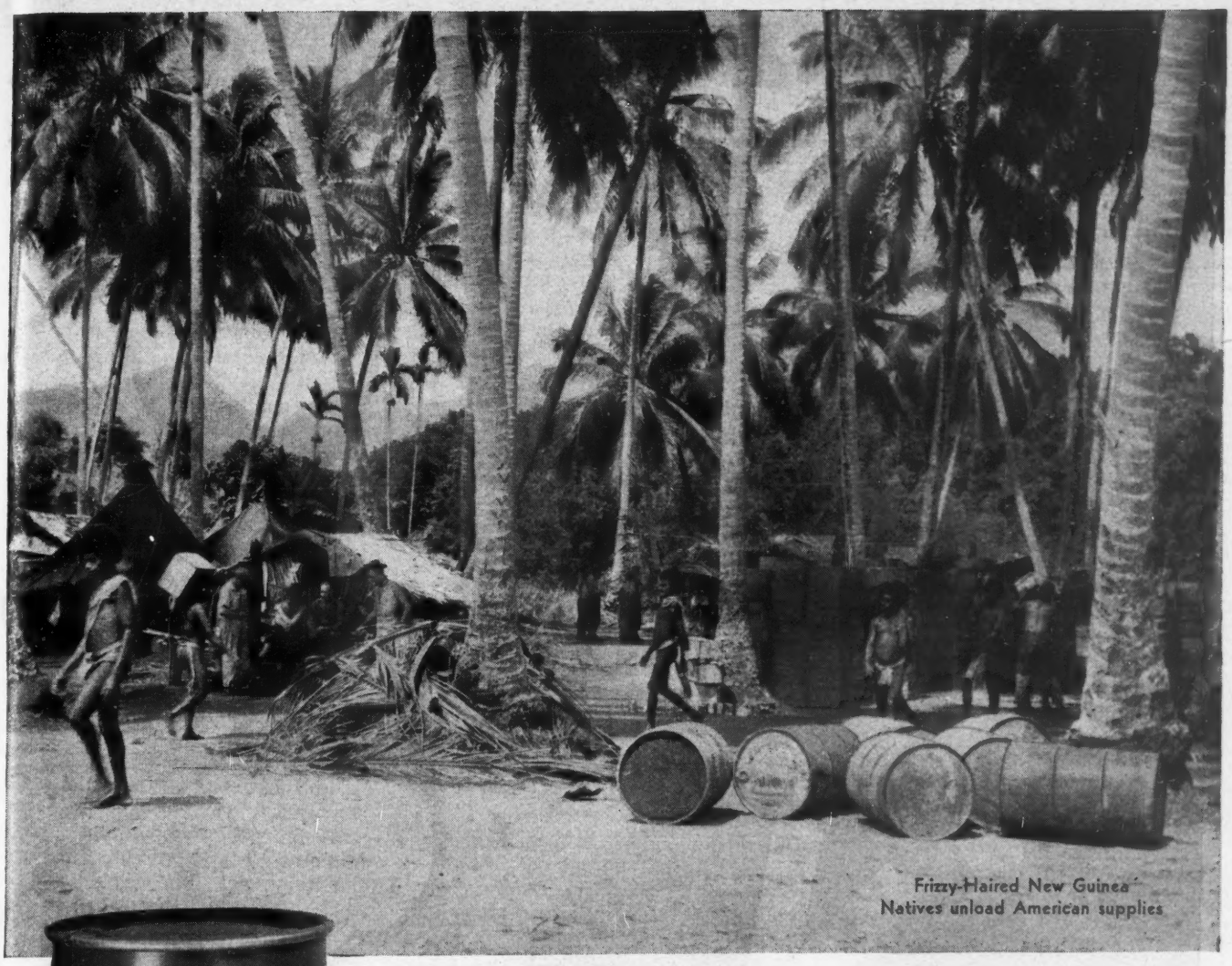

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ROCHE

FOOD TECHNOLOGY

NEW DISCOVERIES AND INVENTIONS

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Processed Cheese

AMMONIUM metaphosphate, diammonium disodium pyrophosphate, or mixtures of the two, will soften the casein of cheese so that the product has a very smooth body and texture, and a natural cheese flavor. Finely divided cheese is heated with 1 to 5 percent of the emulsifying agent and 10 percent water, agitating continuously at a pasteurizing temperature of 130 to 180 deg. F. for 30 minutes to 1 hour, then is placed in molds and cooled.

Digest from U. S. Patent 2,319,187, issued May 11, 1943, to J. D. Ingle, and assigned to Industrial Patents Corp., Chicago.

Sweetened Milk Powder

A DUTCH process, described in a recent patent vested in the Alien Property Custodian, adds reducing sugars, preferably pure anhydrous glucose, to sweetened block milk to prevent the development of tallowy taste. The object is to reduce the oxidation-reduction potential to a value at which oxy-fatty acids are not formed from the unsaturated fatty acids of the whole milk.

In milk products sweetened with sucrose, protection is obtained with one part by weight of pure anhydrous glucose to each 3 parts by weight of milk fat. The total amount of sugar in the evaporated product may vary from 30 to 70 percent, being generally 45 to 50 percent. Glucose may be present as 10 to 15 percent of the total sugar.

The ability of the milk proteins to swell is protected by buffering to pH 6.3 to 7 with 0.01 to 0.02 percent of a weakly alkaline salt such as sodium phosphate, sodium-ammonium phosphate or sodium citrate. This gives an easily soluble product, of excellent keeping qualities.

The sweetened and buffered whole milk is evaporated in vacuo at temperatures less than 122 deg. F., to a water content of 8 to 12 percent. The evaporated product is poured warm into molds and allowed to set.

Blocks so produced may be powdered, but special milling disks must be used because of the tendency of the mass to become sticky and to overheat. The ground particles must be moved to a drying chamber without any pressure, and are best conveyed by air. Drying temperatures must not exceed 176 deg. F. and are preferably about 122 deg. F., with a drying time of 30 minutes. The powder is dried to less than 2 percent moisture, usually 1 to 1.5 percent.

These milk powders are useful in pudding powders, prepared cereal foods, and for the preparation of powdered mixes for cocoa- or coffee-flavored milk drinks.

Digest from U. S. Patent 2,319,362, issued May 18, 1943, to O. J. Wouters, and vested in the Alien Property Custodian.

Evaporated Milk Color

HIGH-TEMPERATURE forewarming of whole milk does not adversely affect the color of the commercial evaporated product, and the resultant color may even be more desirable than that of another portion from the same milk forewarmed at 203 deg. F. for 10 minutes. A curve showing the relationship between temperature and time to produce a similar color in the sterilized evaporated milk permits selection of the proper forewarming temperature.

Color in the evaporated milks containing more than 26 percent total solids is not in proportion to the increased solids content, and evaporated milks of similar color made under different conditions vary greatly in heat stability. The color depends on unidentified characteristics of the raw milk, as well as on processing conditions.

Digest from "Relationships Between High Temperature Forewarming and the Color and Heat Stability of Evaporated Milks of Different Solids Content," by R. W. Bell and B. H. Webb, *Journal of Dairy Science*, vol. 26, 579-85, July, 1943.

PICKLING

Factors in Flavoring With Essential Oils

THE principal and characteristic flavor of a spice is contained in the steam-volatile essential oil. These oils are practically insoluble in water and only slightly soluble in acetic acid solutions, so that only a small proportion of the oil is available when whole spices are used in a pickling brine. Repeated extractions from whole cloves with 136-grain vinegar resulted in a total extraction of 47.8 percent of the oil, but the usual extraction is much less and tests on whole spices which had been used in commercial dill pickle manufacture indicated that the spice mixture retained most of its volatile oils.

Essential oils, whether extracted from whole spices or added as oils, are present as small globules in the pickling brine. From 18 to 63 percent of the oil added as such to spicing liquor was absorbed by unspiced processed pickles, most of it being held in the epidermis of the pickles. There is a direct correlation between the amount of ether-soluble materials in the pickle and the absorption of essential oil.

Various methods tried for incorporating a 1:1,000 dilution of dill oil into pickles showed little difference in the amount absorbed during a 3-week period.

Digest from "Factors Influencing the Flavoring of Pickles with Whole Spices and Essential Oils," by F. W. Fabian and M. C. Van Wormer, *Food Research*, vol. 8, 95-104, March-April, 1943.

DEHYDRATION

Dehydrated Vegetables Under the Microscope

THREE closely related reports by the same author cover microscopical studies of great interest in vegetable dehydration. Two protective mechanisms in the dehydrated vegetables are reported —the solution of carotene in oils liberated by heat from the lipoprotein complex, and the sealing of the tissues against oxidation by the drying of starch which has undergone gelation. All conclusions are based on microscopic examination of many specimens.

For investigating "case hardening," mature carrots were selected to represent fleshy vegetables low in starch, and white potatoes were used as typical of starchy vegetables.

With fully grown carrots there appear to be no differences in hardness between dehydrated samples which have been blanched and those not blanched, or between the outer case formed early in the drying process and the completely dried inner tissues. When evaporation is inhibited by the formation of an outer case, the trapped moisture breaks down the inner tissue. In samples flash-dehydrated at 257 deg. F. or more, the inner tissues were badly macerated, with the formation of large and irregular pockets and caramelization. Such samples reconstitute poorly. In properly dehydrated samples the cell wall

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structure remains intact. The carrot tissue is high in pectic substances and the cellulose-pectic complex creates a much harder product than when leafy vegetables are dehydrated.

Blanching causes swelling and gelation of the starch grains, so that if dehydration is begun immediately after blanching the starch is in a gel state during the initial periods of drying. With unblanched potato the initial shrinking of the surface crowds the starch grains together, and if the shrinkage is severe the starch grains may be forced out of the tissue through rupture of the cell walls. Gelation occurs only after the wet-bulb temperature reaches the gelation point, which may be several hours after drying starts. Starch grains were found intact in potato samples after as much as 2½ hours at 194 deg. F., dry-bulb temperature.

Due to the gelled starch, dehydrated blanched potato develops a brittle and glassy texture. Raw potatoes dried near or below the gelation point, with ruptured cell walls and loose surface starch, are frequently pasty and lumpy when reconstituted, and lumpy when cooked.

Carrot Oils and Carotene

The second paper concerns relationships between carrot oils and carotene. Carotene, essential oils and lecithins are directly involved in changes during dehydration and storage. These occur free, or weakly combined with the proteins of the cytoplasm. The lipoprotein complex is readily destroyed and the lipoidal substances are freed when denaturation of the cytoplasm takes place as a result of heating, drying or freezing. The freed oils may then oxidize and fatty acids may be liberated.

When carrots are heated, the carotene goes into solution in the liberated oil. This solution appears as a film in the dehydrated blanched carrots. During dehydration of unblanched carrots the carotene does not have time to go into solution after the breakdown of the lipoprotein, and low temperature dehydration methods permit still less solution. After two months storage in air, carrot tissue that had been frozen and vacuum dried was decidedly lower in carotene than were blanched heat-dried samples, and had more pronounced off-odors than dried unblanched carrots of the same age, similarly stored. No oil film could be detected in the vacuum-dried frozen carrot. It is recognized that carotene can be preserved by dissolving it in fixed oils.

Off-odors cannot be avoided by blanching alone, since carrot oils contain at least one unsaturated fatty acid which must be regarded as a possible source of future off-odors. But when young carrots containing starch are blanched and dried, the gelled starch seals the tissues and prevents oxidation of the vegetable fats present.

Other Root Vegetables

The third paper presents further evidence of this mechanism which is particularly well illustrated in the case of sweet potatoes, which contain both starch and carotene. Among the other vegetables studied, parsnips have considerable starch, which gels at 158 to 167 deg. F., and do not give any difficulty when blanched or dehydrated above this gelation temperature. Turnips and rutabagas suitable for food do not contain much starch, and the sugar content does not appear to provide any antioxidant mechanism. A pectin dip is suggested. Beets do have a protective mechanism, which may be the sealing of the tissues by the natural pectins and may be the adsorption of the freed oils on glucoside crystals. For color preservation, beets should be blanched whole, then peeled and sliced thinly, and dried so that they will reconstitute in a minimum of water. Only young beets should be dehydrated, due to the woodiness of the older roots.

Blanching is recommended in all cases, rather than dehydration above the gelation temperature, because blanching protects the vitamins during dehydration as well as in the dried product.

Digest of "A Microscopic Study of the Physical Changes in Carrots and Potatoes During Dehydration," "Microscopy of the Oils and Carotene Bodies in Dehydrated Carrots," and "Changes in Tissue Composition in Dehydration of Certain Fleshy Root Vegetables," by R. M. Reeve, *Food Research*, vol. 8, 128-36, 137-45 and 146-55, March-April, 1943.

BAKING

Wheat Germ in Bread

ANALYSES are reported for 11 samples of commercial wheat germ from different types of wheat. All the samples were contaminated to some extent with flour or bran, those from hard wheat being least contaminated.

The moisture content is relatively low. Wheat germ will keep fresh for several months if stored at temperatures not much above 50 deg. F., protected from light.

Samples averaged: protein, 28.9 percent; sugar (sucrose), 13.7 percent; fat, 9.7 percent; ash, 4.1 percent. Pure germ from hard wheat appears to be higher in protein content than that from other types.

In bread making tests, very satisfactory results were obtained with germ from white, soft red winter, hard red winter and durum wheats, but that from hard spring wheat was not as satisfactory. It is possible to use up to 20 percent of steeped wheat germ in bread,

but 2½ to 5 percent is recommended, and in that range the bread may be better than when no wheat germ is used.

To increase diastatic power and decrease oxidizable substances, the wheat germ must be steeped in water for several hours before it is added to the dough or sponge. Handling properties of the dough are improved by addition to the steep water of salt in the proportions usual in bread making, and addition of potassium bromide is recommended.

Digest from "Commercial Wheat Germ, Its Composition," and "Wheat Germ in Bread Making," by E. Grewe and J. A. LeClerc, *Cereal Chemistry*, vol. 20, 423-34, and 434-47, July, 1943.

MISCELLANEOUS

Clam Juice Concentrate

PARTIAL freezing in air at about 0 deg. F. for 4 or 5 hours, followed by suction filtration (or centrifuging), yields a clam broth concentrate containing about 12 percent total solids, and a second freezing raises that figure to about 21 percent, from an initial 5 percent.

The clam broth is a byproduct in the commercial canning of hard-shell clams. Although the solids content is low, the broth contains valuable mineral nutrients and has a desirable flavor and aroma when used alone or incorporated in other dishes. The freezing process results in about 90 percent recovery of solids, with no impairment of the flavor.

It is suggested that the freezing method is applicable to the concentration of other marine products.

Digest from "Concentrating Clam Nectar by Freezing," by N. M. Carter, *Progress Reports of the Pacific Coast Stations, Fisheries Board of Canada*, No. 55, 13-15, June, 1943.

Chloride Determination In Salted Fish

PROTEIN interferes in all the usual methods for the determination of chloride. A method for direct titration of the chloride in salted fish is based on the fact that at pH values in the vicinity of 4.5 a minimum adsorption of silver by the protein occurs. An acetic acid-sodium acetate buffer is used, and the chloride is determined by titration with silver nitrate. Dichlorofluorescein is the indicator. The end point is clear, operation is quick, and the results check with those of the standard Volhard method. The presence of fish oil does not interfere.

This titration method has been in use for over a year.

Digest from "Rapid Determination of Sodium Chloride in the Presence of Protein," by W. J. Dyer, *Industrial and Engineering Chemistry, Analytical Edition*, vol. 15, 439-40, July 15, 1943.

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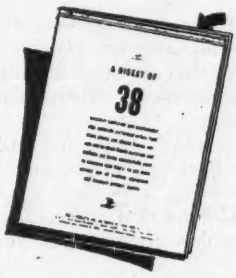

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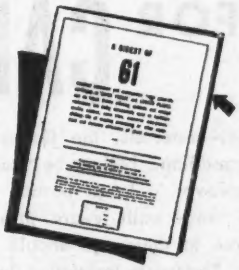

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Tests Save Materials

(*Continued from page 57*)

Many simple and inexpensive improvements will produce gratifying returns, for example, an edge on a table to prevent loss to the floor, a receptacle to catch spillage or leakage and keep it clean enough for reuse, more complete emptying of incoming raw material containers, reduction of overfill in outgoing packages, recalibration of gages or meters, or substitution of a definite weight or measure for an estimate. Obviously, a reasonably successful company cannot be grossly inefficient and remain in business, hence the yield study must not be expected to result in immediate spectacular savings. Rather will it pay its way through its attention to small losses, tolerated in the old days of plenty but which add up in time to worthwhile proportions.

6. **Reports:** The final step necessary to make the yield study effective is a clear, complete report. This is no place to discuss the principles of report writing; but it should be noted that a yield study may require several weeks of observation and experiment and may produce a lengthy report. Brief, weekly progress reports are, however, useful, not only to chart the general trend of the investigation, but also to stimulate suggestions and questions which greatly increase the value of the study.

It has proved helpful to have a long report explained and amplified verbally by its author. This can be done at a general round-table discussion involving foremen, cost accountants, plant engineers, laboratory representatives and management. At this time the soundness of the recommendations can be debated and the plans for adopting them developed in detail. Thus the whole story is brought to a sharp focus and results in concrete useful action.

Summary

The general method of organizing a yield study may be quickly stated as follows:

1. Recognize the need for getting the maximum useful product out of every pound of raw material.
2. Assign a full-time, impartial, observant investigator to study one department at a time.
3. Let the investigator familiarize himself with all pertinent plant records.
4. Let the investigator study physical plant operations in detail, locating all material losses.
5. By actual tests and measurements, evaluate losses in weight and in monetary value.
6. Seek practical corrections for losses, and formulate recommendations.
7. Discuss report with all concerned, and put recommendations into effect.

Yield studies have eased somewhat the transition from an economy of plentiful raw materials to one of scarcity and have paid their way by the savings they have effected. The program is being extended not only to the various departments of the plant where it was begun, but to other units of the company also. And there is the still broader aspect of the matter as well—the satisfaction that comes in helping to stretch existing food supplies to the limit and helping to eliminate all unnecessary waste at a most critical moment in our history. If this discussion enables other food processors to do likewise, it will have achieved its purpose, and the sum total of all the resulting savings will be a worthwhile contribution to the vitally important food needs of the United Nations.

Conditions affecting the application of yield tests to discover where savings can be made in raw materials will never be identical in two different plants. Still there are some general principles which may benefit other manufacturers in these critical times. And where the methods discussed in this aritcle do not apply specifically, they may suggest more workable alternatives.

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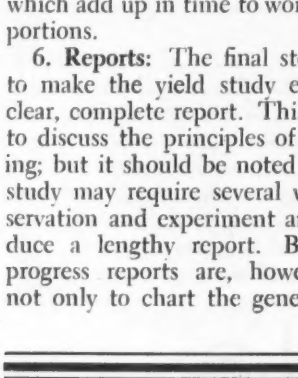

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(*Continued from page 71*)

The author wishes to thank Food Machinery Corp., Hoopeston, Ill., and Olney and Carpenter, Inc., Wolcott, N. Y., for their cooperation in this work.

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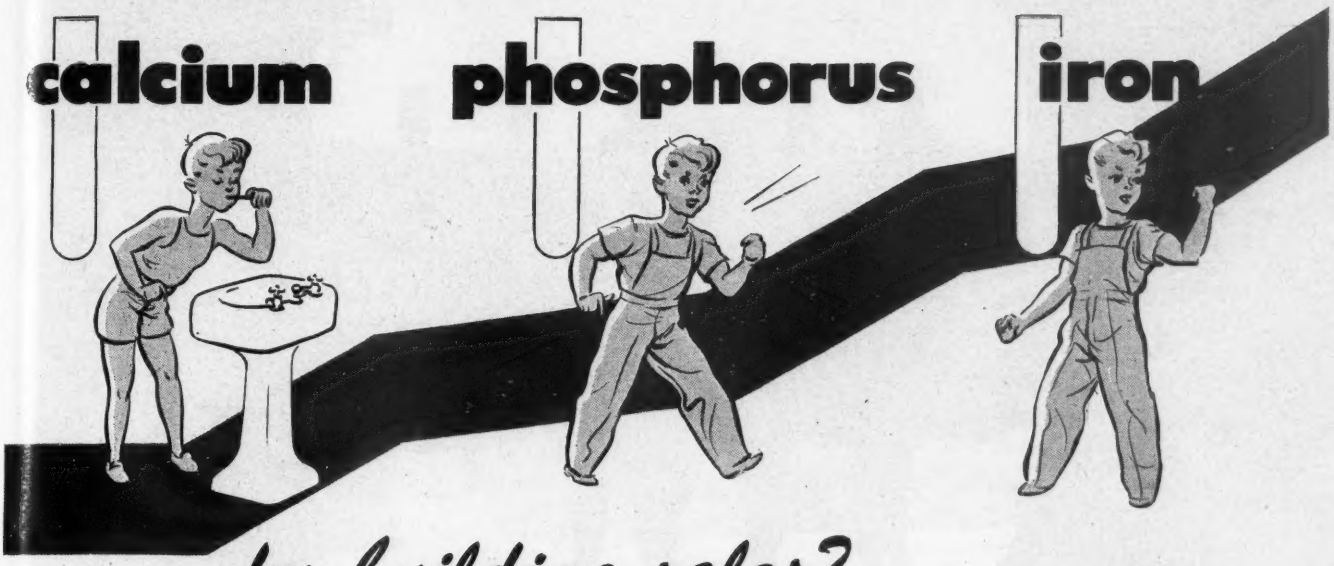

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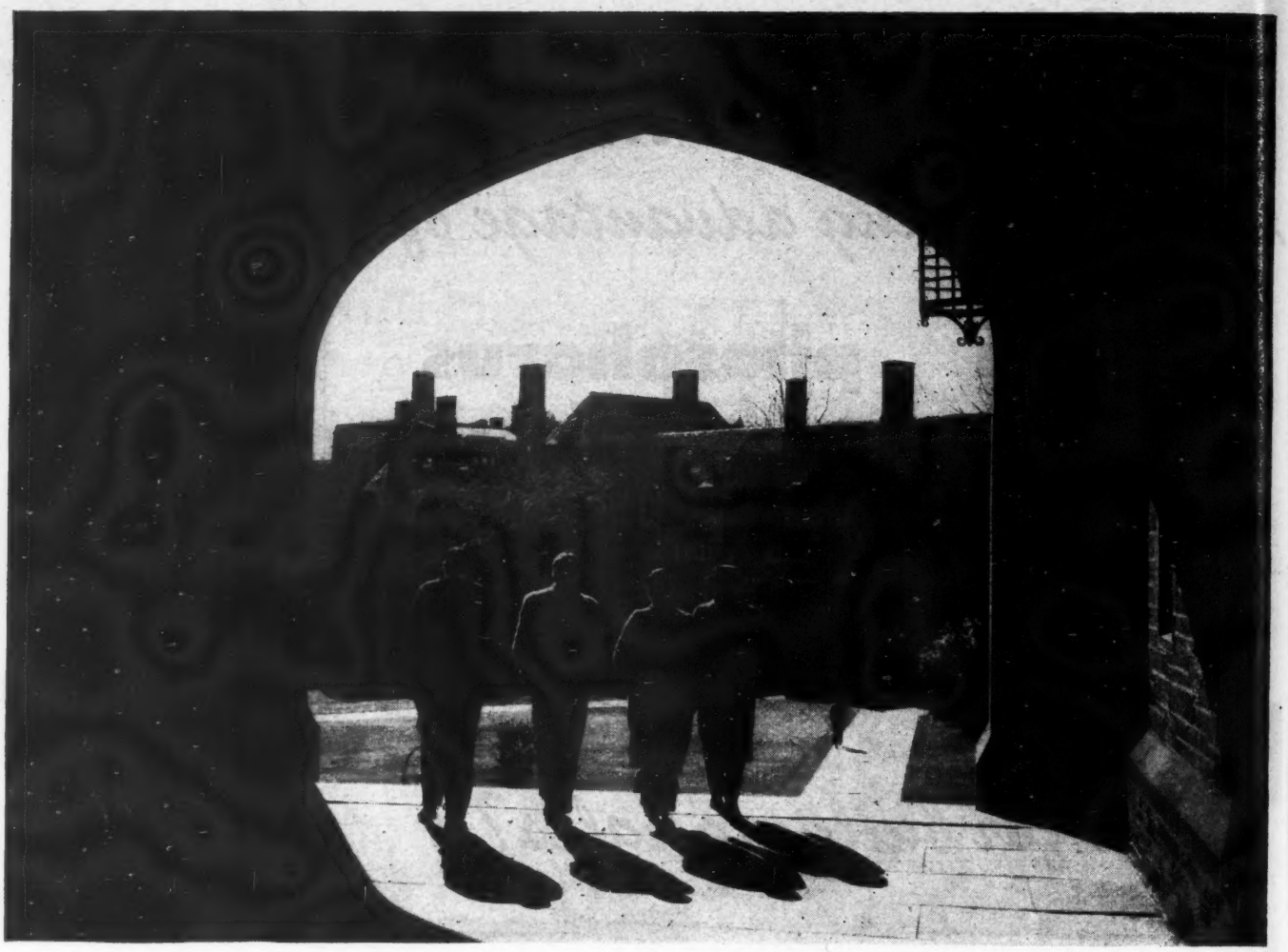

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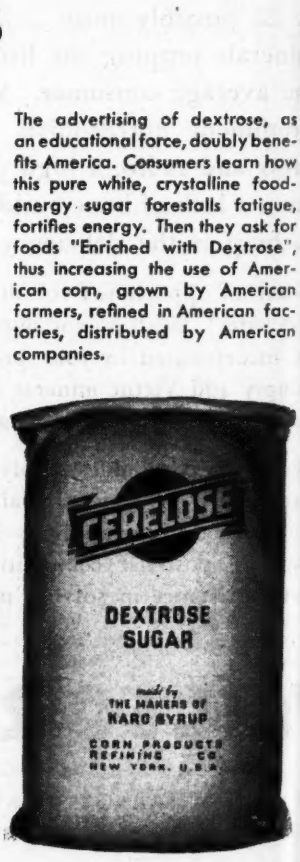

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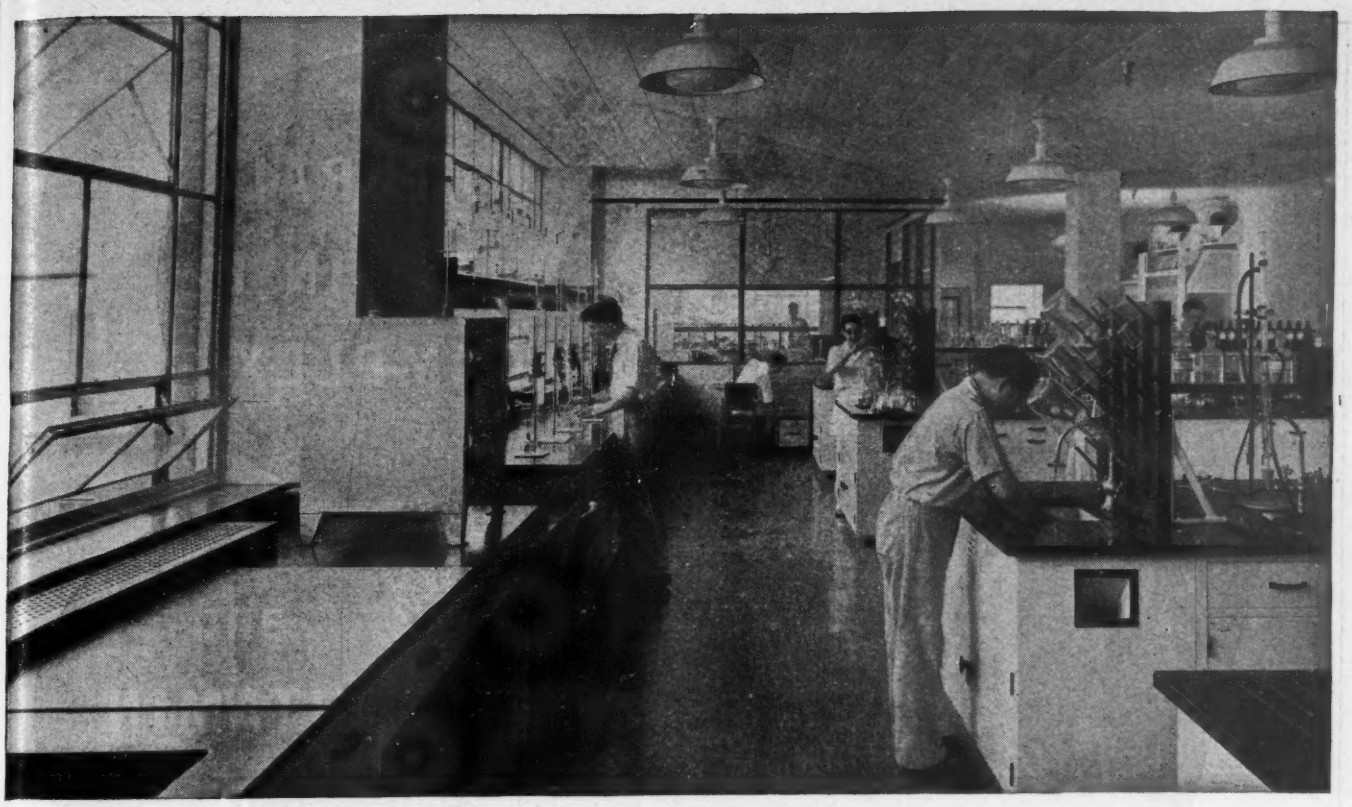

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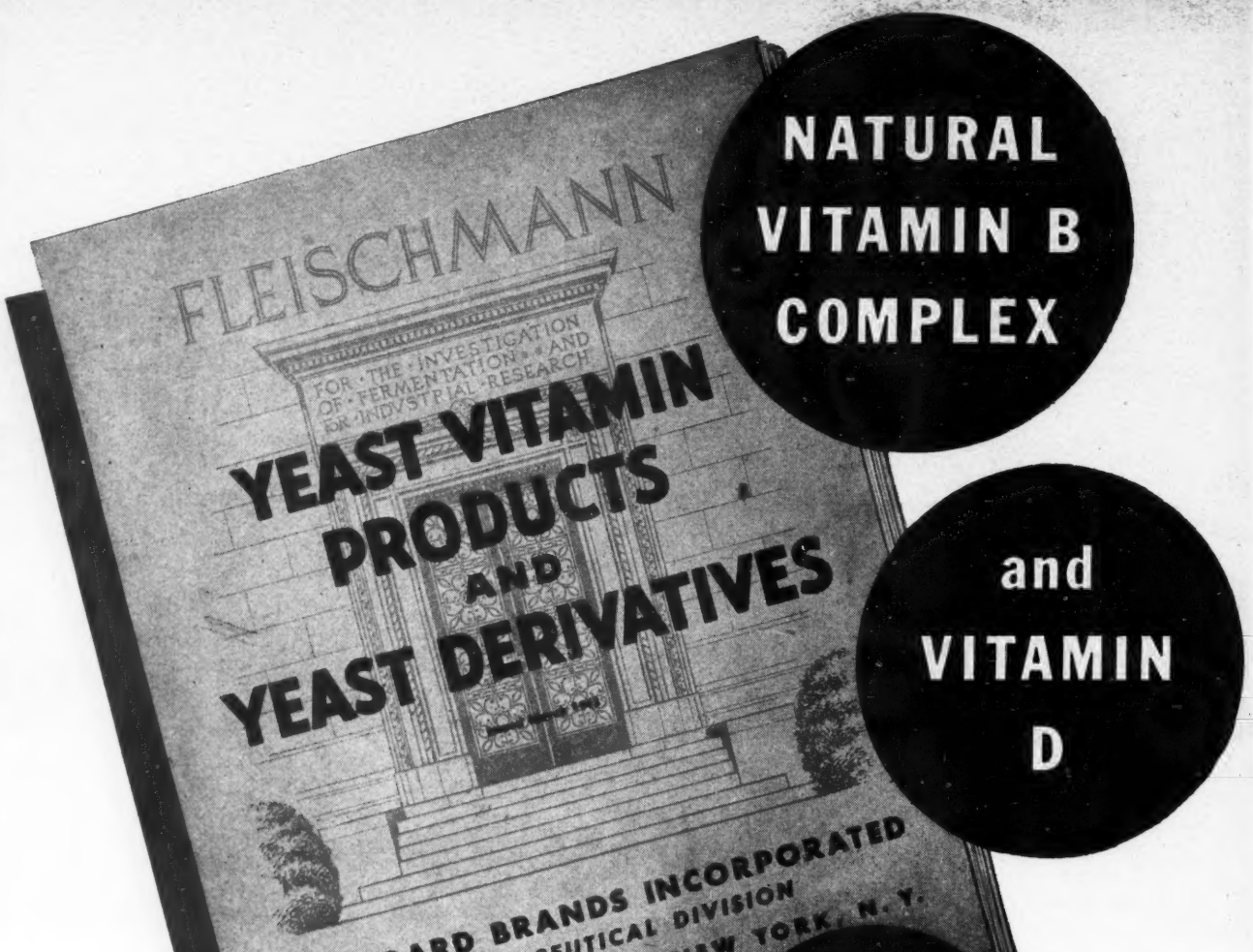

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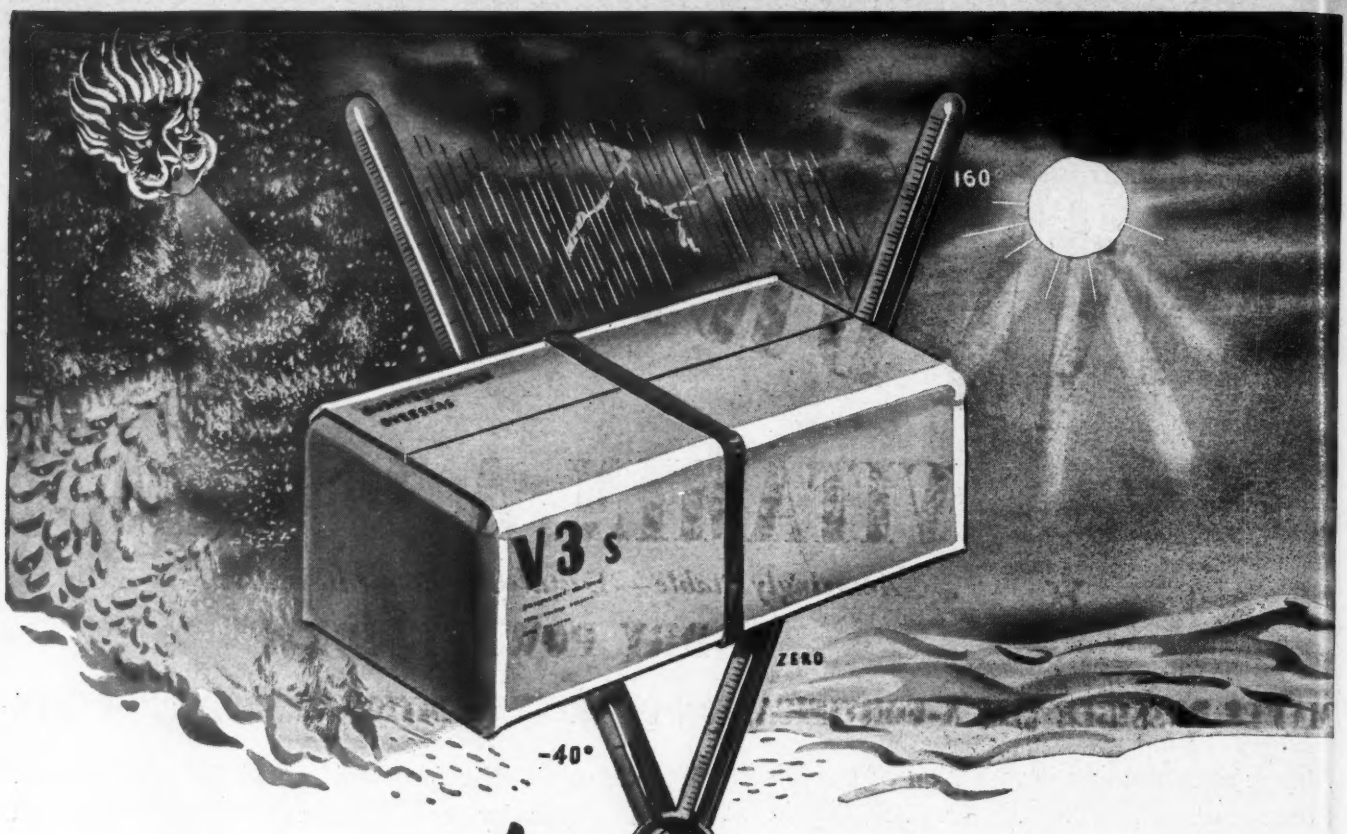

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J. B. (*Sales*): Dunno why, Tom, but we're certainly getting a better reaction from the market these days.

T. S. (*Production*): How's that, Joe?

J. B. We used to get complaints now and then about lint from sugar bags and other foreign particles getting in our candy. Once in a while someone would report breaking a tooth on a hard substance. Must have lost a lot of customers through the years — but no more.

T. S. That's probably due to those new strainers we installed in place of the wire screens we used to have. Our new Cunos get rid of any lumps or impurities that happen to get into our product. The wire screens used to puncture, once in a while, and let undesirable solids get through.

J. B. How do they work?

T. S. Well, the filter element is made of metal discs spaced exactly right for the fineness we want. We get uniform smoothness, always. Then, it's ***continuously cleanable*** — just turn a handle, by hand or motor, and the embedded solids are combed out without having to shut down the line. The filter element is permanent, so there's nothing to replace. Saves a lot of time and money.

J. B. Good enough! It's certainly bucked up sales, too!

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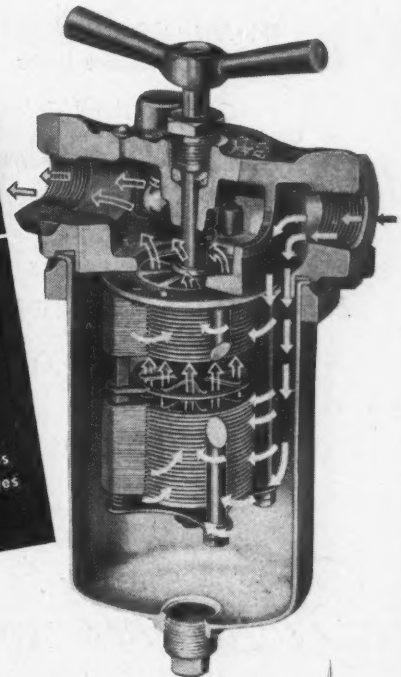

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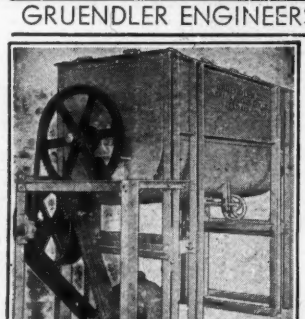

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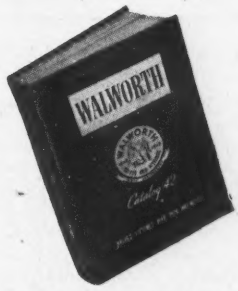

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INSIDE NEWS

SEPTEMBER PREPARED BY NATIONAL CAN CORPORATION, NEW YORK, N. Y. 1943

Safety In Foremanship

Employee injuries, lost time, delayed work and internal dissatisfactions are usually preventable through instruction, good housekeeping and daily check-up of men and machines. The cooperative foreman is safety-conscious always.

One of the most important qualifications of a good foreman is the ability to carry out the policies of his Company with respect to the safety program. He appreciates the importance of safety, because the prevention of accidents keeps his working force complete, maintains production, prevents waste thereby making him a more important factor in the success of his Company. Then, there is the self-satisfaction of knowing that the prevention of accidents eliminates unnecessary pain and suffering among workers and their families.

Perhaps three phases of his job which contribute most directly to the prevention of accidents are—(1) good housekeeping, (2) job training, and (3) accident investigation.

With respect to good housekeeping, it produces good work habits. It reflects in the attitude toward work. "A place for everything and everything in its place" slogan is an important step toward maintaining a safe, healthful works place for the employee and it prepares him for the acceptance of the accident prevention program, because in this he sees physical evidence of the employer's sincere interest in the work itself.

With respect to job training, the foreman who is getting ahead today knows the proper way to perform the duties for which he is responsible. He realizes that the employee, too, must understand his job in order to work safely. He may transmit his knowledge of the job as follows:

1. By showing the employee—telling him.
2. By letting the employee try the operation.
3. By repeating the procedure, correcting mistakes made by the employee on his trial.
4. By encouraging questions from the man, conducting himself so that employees will not be afraid to ask them.
5. By giving clear, detailed instructions.
6. By pointing out the hazards encountered on the job, explaining how they can be avoided.
7. By telling the man to take his time and to do a good, safe job, as he will be judged on the quality of his work, and not the quantity.
8. By follow-up, through frequent contact, especially during the first weeks of employment.

As regards accident investigation, after it happens, the very best precaution against recurrence is to find out "why" and then eliminate the cause. The foreman approaches this task of determining the cause with the realization that 98% of all accidents are preventable since the cause can be controlled. The 2% which are non-preventable result from Acts of God. He will get the best results from the investigation by—

1. Acting promptly. Conditions may change quickly, and details are soon forgotten. Further, promptness demonstrates to the men that the management attaches a great deal of importance to this work. Completely avoid the idea of fixing blame. Otherwise the "cover-up" attitude is apt to develop, making it difficult, if not impossible, to get all the facts.
2. Looking for the physical hazards. Was the layout proper? Was guarding standard and adequate? In other words, what can our Company do to make the operation safer for the workmen?
3. Looking for the unsafe act. Did the employee understand his job? If not, why not? Investigation may lead to the need for determining where he was on the previous evening, or determining whether there are domestic difficulties, or grievances against the Company. Here, the foreman wants to know why the employee committed an unsafe act, and he will avoid the use of the word "carelessness".
4. Conclusions that are reasonable and satisfactory with definite recommendations for corrective action.
5. Following closely to see that corrective action is taken.

Yes, the modern foreman in modern industry has many important assignments which he *must master* and among them is the prevention of accidents. (421)

Rice Conversion Process Maintains Soluble Vitamins

A new war-time development, at present available through a Texas company only to the Army, promises to receive extensive use for civilian consumption when manufacturing capacity is extended after the war.

In processing rice by this conversion method, brought from England about two years ago, the grain while still in the husk is saturated with hot water by vacuum and pressure, and later dried and milled, removing the husk and bran. Due to the endosperm permeation with hot water, it is highly vitimized with the soluble vitamins found in unmilled rice.

Besides high vitamin content, the rice is impervious to weevil infestation under normal storage conditions and cooking qualities improve materially. This processed rice is suitable for canning and avoids the necessity of importing seeta patna parboiled rice from India.

Ethylene gas is being considered to aid in storing combine rice without it heating. (422)

"Goma Laca" Being Used in Brazil

Pine knots from Rio Grande do Sul background "goma laca" which Brazil is attempting to develop as a shellac substitute.

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It has proved completely satisfactory in manufacture of floor wax, and is being used in a mixture with equal parts of shellac on some inexpensive grades of furniture. Attempts to use it in manufacture of hats and phonograph records have not proved successful. (423)

Colloidal Fuel For Industrial Furnaces

A long-time goal of research chemists and engineers—development of a fuel combining oil and coal—is being given exhaustive tests by U. S. Bureau of Mines and a refining company in an industrial boiler of the company. Success in developing such a colloidal fuel for industrial furnaces, heating plants and power generators will reduce by about one-third the amount of such oil needed, and will play an important part in alleviation of petroleum shortage along the Atlantic seaboard. (424)

EVERY MAN ON HIS OWN FEET

National Can's part to help keep American soldiers foot-healthy is this 3½ oz. can of foot powder. Compounded to U. S. Medical Corps formula by a private drug house, this relief for sore, chafed feet keeps our Army fit "from the ground up". (425)

Canned Live Worms

An enterprising Wisconsin producer has placed a new canned product on the market. It is not strictly a food—except for fishers, for it is "canned live worms". The worms are described as flat red water worms and are claimed by the packer to be very lively. They are packed alive in No. 2 sanitary cans with moss and sufficient food in the cans to keep the worms alive for 30 days if they are not subjected to high temperatures. Air is admitted into the cans by small pin holes just under the seams around the top of the can. The "canned live worms" are marketed through the sports department of department stores and sport shops. (426)

Technical Topics

CYCLOHEXYL CAPRATE—Suggested for use as insect repellent, in a recent U. S. Patent. It is claimed that the material may be used with alcohol, oil or soap and water. (427)

TRIMETHYL CYCLOHEXANOL—The compound is an alcohol, practically insoluble in water but soluble in most organic solvents, hydrocarbons, and oils. (428)

CORROSION—Activated carbon, treated with ammonia and zinc oxide, was found superior to barytes in production of corrosion protective coatings containing red lead, according to a recent German technical article. The atmospheric corrosion tests were carried out on rolled steel sheets. (429)

ZEIN—Dispersions can be stabilized by addition of an aldehyde, such as acetaldehyde, following a short heat treatment. Solutions of zein in usual solvents tend to gel spontaneously in a few days at room temperature. (430)

CHLORACNE PREVENTIVE—Sulphonated castor oil is the basis of a suggested industrial skin cleanser to combat possible deleterious effects of machine tool cutting oils. A wetting agent is compounded with sulphonated oil. Application is suggested once or twice a week. (431)

CITRIC SUBSTITUTE—Phosphoric and lactic acids are being offered as a citric acid substitute, so proportioned that one pound of the liquid acids equals one pound of citric acid in flavor. Official requirements are said to be satisfied. (432)

FUNGUS INFECTIONS—Cadmium salts are claimed, in a recent U. S. Patent, capable of preventing and possibly curing fungus infections, such as those causing "athlete's foot". Excellent results were claimed for cadmium chloride and a wetting agent dissolved in 30% alcohol. (433)

ANTIBACTERIAL AGENT—Tyrothricin, derived from a soil organism, (Bacillus Brevis), is being offered by an American pharmaceutical manufacturer for use locally in sterilization of wounds, indolent ulcers of the skin and body cavities. An advantage of retaining its effectiveness in presence of pus is claimed. (434)

FIRST AID FOR BURNS—Sulphothiazo powder, rather than tanning agents, is recommended as best first-aid for burns from experiences of British forces at Tobruk. It has a wider range of bacteriostatic activity than sulphanilamide. (435)

BARYTES SUBSTITUTE—Ground pottery waste is being considered in Britain as a possible substitute in paint compositions. (436)

MENHADEN—The Atlantic coast's most abundant fish, heretofore only used for commercial oil, fertilizer and bait, is being canned in a process giving a salmon-like flavor. A million cases a year are expected. (437)

MEAT TENDERIZING—Three newly-patented methods are announced. Ficin, under controlled time and temperature conditions; the use of bromelin; and the action of proteolytic enzymes under controlled time and temperature. (438)

FISH ODORS—Catalytic hydrogenation under controlled temperature and pressure in the presence of activated carbon, removes objectionable odors from fish oils in a newly-developed process. (439)

"BROWNING"—Peaches, pears and apples are prevented from browning during and after freezing by thiocarbamide treatment. For peaches and pears, a 0.1% solution is sufficient, and presence of sugar does not interfere. For apples, 0.15 or 0.20% is required and sugar does interfere. When fruit is dipped into this solution and frozen, the browning system is inactivated so that browning will not occur when the fruit is thawed and exposed to air, even after being leached in water to remove the thiocarbamide. (440)

COFFEE REFRESHANT—Sweeping with nitrogen for seven days restored coffee, staled after being sealed in a can with oxygen for 19 days, to a comparatively fresh condition. However, a sample held for 32 days, was stale both before and after treatment. Moisture vapor, in addition to oxygen, has a deleterious effect. With 2.6% added water, flavor of vacuum-sealed coffee was not impaired in 12 days, but as little as 0.9% had a noticeable effect after 32 days. (441)

Every effort will be made to furnish additional information on these articles. Where such information is not obtainable, we will refer inquiries to the original source of the article. Write to National Can Corporation, 110 East 42nd Street, New York City. Please mention the number at end of article—also name of the magazine you saw it in.

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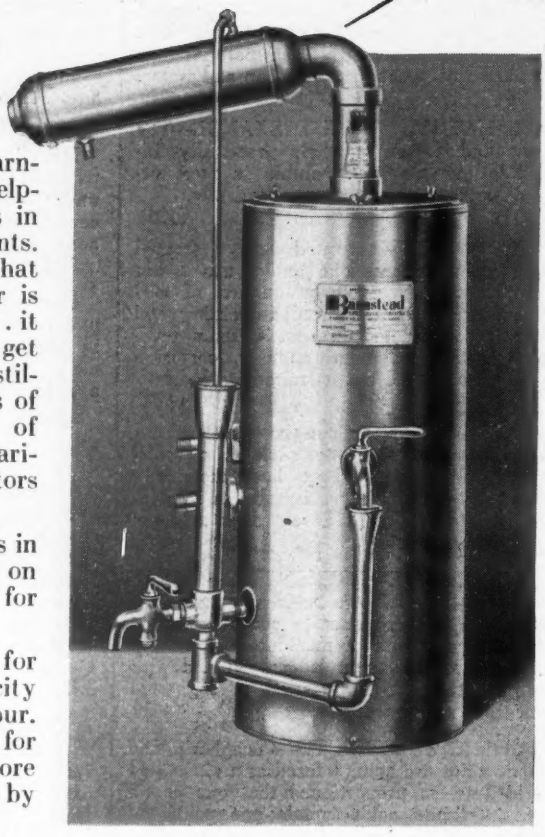

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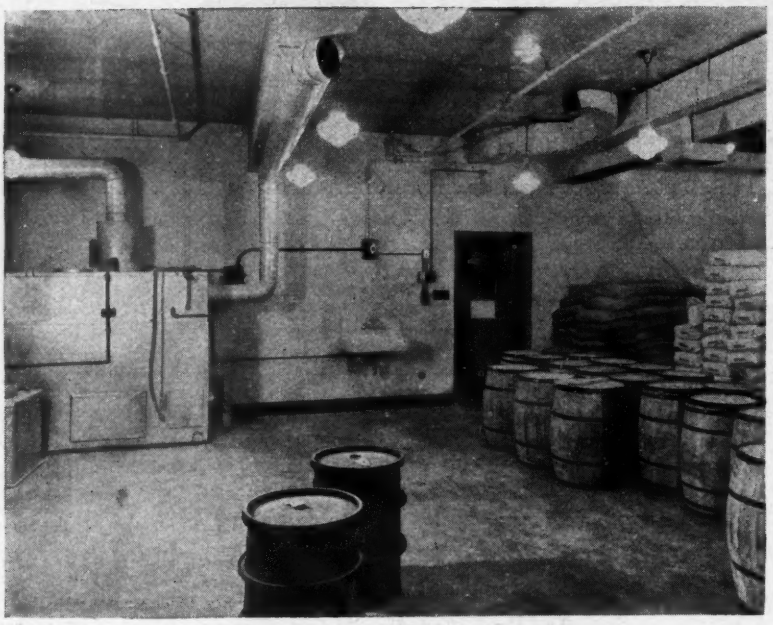

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The economy of working with atmospheres of constant dryness has been proved by many processors in various industries. By using Lectrodryer dehumidifiers, they have been able to standardize processing times and hold products uniform. They can obtain lower moisture contents than were possible with ordinary drying methods. Lectrodryers have made them independent of outside weather conditions.

Hundreds of Lectrodryers are at work drying air, gases and many organic liquids. Working with Activated Alumina as their drying agent, they remove moisture efficiently and surely to dew points below —110°F. They dry air and gases at atmospheric pressures or compressed as high as 3,000 pounds per square inch.

Lectrodryer engineers can help on your war-production drying problems, and they'll gladly join you in postwar planning. PITTSBURGH LECTRODRYER CORPORATION, 301 32nd St., Pittsburgh, Pa.

LECTRODRYERS DRY WITH ACTIVATED ALUMINAS

PITTSBURGH

LECTRODRYER

Reg. U.S. Pat. Off.

CORPORATION

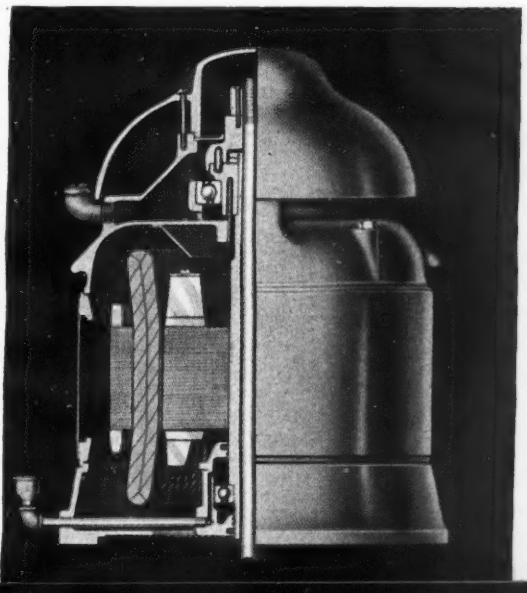
THE MOTORS THAT RUN COOLEST IN AMERICA'S HOTTEST DESERTLAND

DOWN in the lush Coachella Valley of California, where the finest dates are nurtured, huge quantities of water are pumped from very deep wells. Much of the Valley is below sea level. Torrid temperatures prevail during summer. Pumping water in temperatures of better than *110° F.* is a drastic test for electric motors.

It is a significant fact that U. S. Asbestos-Protected Motors predominate in this Valley. These motors were designed many years ago for this particular service.

Ordinary motors couldn't "stand the gaff." They burned out. Pump manufacturers were desperate in their search for a motor that would withstand such service. U. S. Motors engineers were determined to solve the problem. *The* solution came in the application of Asbestos as the protective element for windings. *Asbestos cannot carbonize.*

The necessity of Asbestos-protection in a motor is made more evident in terms of temperature rise. The reason for a *40° C.* standard temperature rise in motors is to prolong motor life by slowing down carbonization of the insulation. The electrical engineer's thermometer reads in degrees Centigrade. *40° C.* rise means *72° F.* Where very hot atmospheric conditions prevail—(perhaps as high as *120° F.*, in field or factory)—and when the motor is subjected to an overload, temperature rise goes beyond the motor's guarantee. *What happens?*



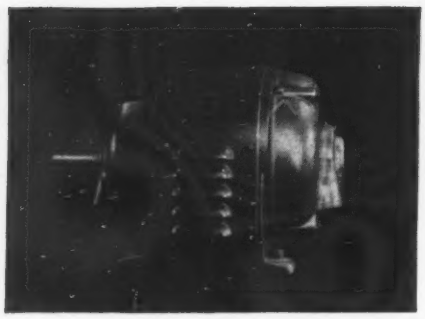
The motor may actually have to operate at, say *237° F.* Bear in mind that *169° F.* is hot enough to start carbonization. But at *237° F. carbonization becomes acute!*

These conditions *do* exist and ordinary insulation cannot withstand them. But in U. S. Motors the windings are Asbestos-protected—and *Asbestos cannot carbonize!*

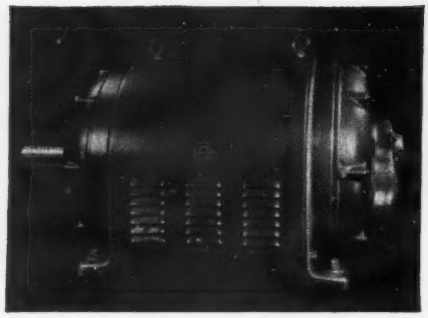
Not only have U. S. Motors solved many obstinate pumping problems in hot regions, but they have brought about revolutionary improvements in deep well pumping. U. S. Motors were the first to be designed as a built-in unit of vertical turbine pumps; the first to add streamline design to pump heads. U. S. Motors pioneered the universally-accepted hollow shaft principle in pump heads. U. S. Motor engineers conceived the AutoStart principle.

U.S. MOTORS

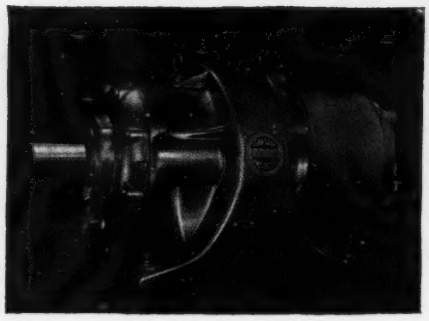
ASBESTOS-PROTECTED



U. S. Horizontal Uniclosed Motor



U. S. Heavy-Duty Uniclosed Motor

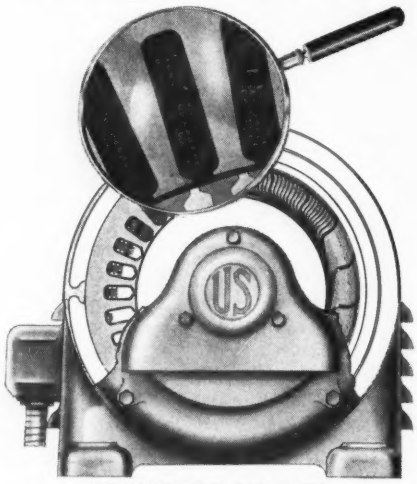


U. S. Horizontal Syncrogear Motor

ALL U.S. MOTORS ARE ASBESTOS-PROTECTED

HEAT originates from two sources in an electric motor stator—(1) from the steel core and (2) from the windings. The windings imbedded in the slots of a stator core are subjected to heat from both elements. A motor burn-out is usually caused by carbonization of the windings. The problem is heat, not voltage. To guard against carbonization, the windings of all U. S. Motors are Asbestos-protected. It's a patented process, pioneered and perfected by U. S. Motor engineers. Instead of using combustible materials such as varnished cloth, paper or oiled linen, we use Asbestos to form the barrier surrounding all stator slots. *Asbestos cannot carbonize.*

After inserting the barrier wall of asbestos insulation into each stator slot, a few turns of wire are threaded into place. When half the slot is filled, a coil separator of asbestos plate-board is positioned, to insulate and provide a heat-proof wall between coils in each slot. Then the lips of the asbestos barrier between the wires and the stator steel are overlapped at the tooth tips.

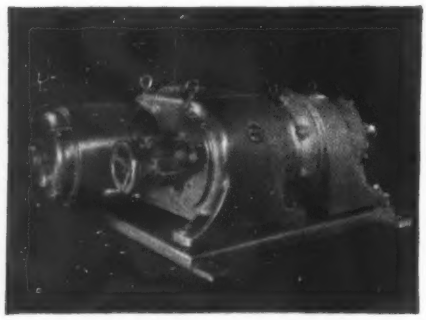


EACH WIRE IS ISOLATED
The above drawing delineates the progressive steps in applying Asbestos to U.S. Motor windings.

The entire stator is then immersed in a tank of Asbestosite for impregnation. Asbestosite is a plastic compound which penetrates the windings. Each wire is isolated—sealed with a surrounding area of Asbestosite. During immersion the wires are gently vibrated so that the non-carbonizing Asbestosite will thoroughly work into the windings and equalize their position, one to another. Finally the stator is baked.

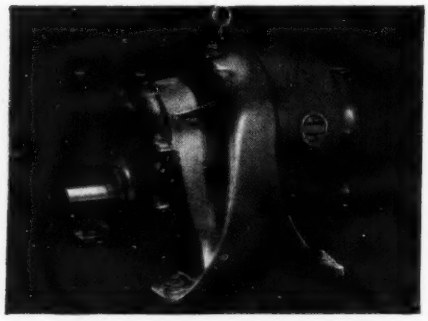
The result is a motor with maximum protection against heat. Any U.S. Motor can operate in torrid temperatures without affecting its power. The windings are forever protected against heat, because *Asbestos cannot carbonize.* Longer motor life is a certainty.

Descriptive Bulletins upon request.



U. S. Varidrive-Syncrogear Motor

U. S. Vertical Syncrogear Motor



U. S. Syncrogear, Type GR

The QUALITY LINE of Power

VARIDRIVE MOTORS	*for infinite speeds*
SYNCROGEAR MOTORS	*for multiplied power*
UNICLOSED MOTORS	*Horizontal and Vertical*
UNIMOUNT MOTORS	*Horizontal and Vertical*
TOTALLY-ENCLOSED MOTORS	*for hazadous services*
AERO-TEST STANDS	*for aircraft servicing*

AUTOSTART *Grinders and Buffers*

U.S. ELECTRICAL MOTORS Inc.

ATLANTIC PLANT: MILFORD, CONN. • PACIFIC PLANT: LOS ANGELES, CALIF.
Assembly Plant: Chicago. Branches: New York, Boston, Pittsburgh, Philadelphia, San Francisco, Seattle. Agents in all principal cities.

U.S. MOTORS

—embody

ASBESTOS PROTECTION
NORMALIZED CASTINGS
LUBRIFLUSH LUBRICATION

STREAMLINE DESIGN • WEATHERPROOF HOUSING
SOLID DIE CAST ROTORS • INTRACOOLED VENTILATION
AUTOSTART ACTION

Uncle Jake says:

INGENUITY plus COURAGE plus WORK equals MIRACLES*

KVP

* A timely thought from

MAKERS OF

FOOD PROTECTION PAPERS

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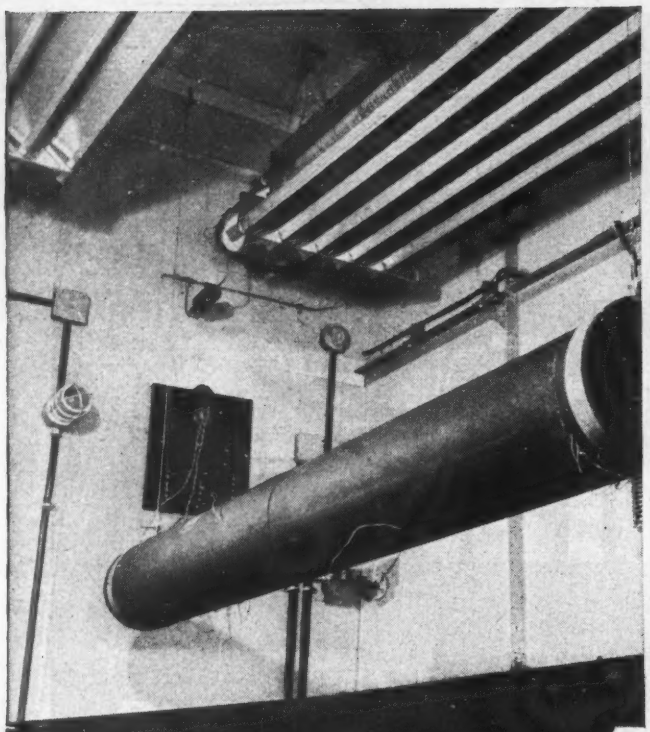
BRANCH PLANTS IN PHILADELPHIA, PA., AND HOUSTON, TEXAS



We manufacture cold to prove ROCK CORK'S efficiency

A VIEW OF THE JOHNS-MANVILLE "COLD ROOM" where insulations for service in the low temperature range are tested. The temperature in this room can be automatically regulated and kept constant.

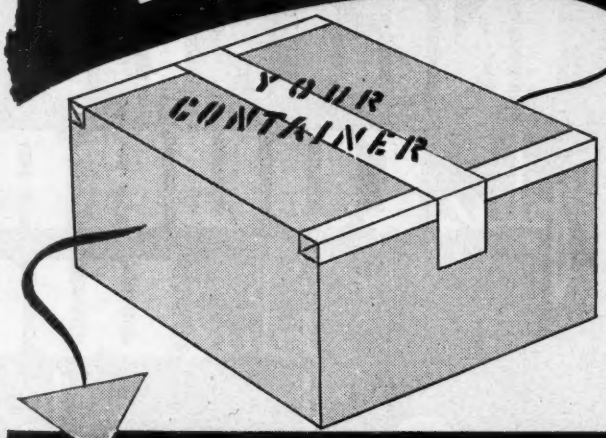
In the JOHNS-MANVILLE insulation laboratories—among the best equipped in the world—specially trained technicians subject low temperature insulation materials to conditions even more severe than they will have to face in actual service. J-M Rock Cork, widely used in low-temperature insulation service, meets the most exacting tests of these laboratories.

Formed by an interlacing of mineral fibers, J-M Rock Cork is exceptionally successful for all kinds of cold-storage construction. Factors responsible for its wide use are low conductivity at low service temperatures, non-absorption of moisture and odor, and immunity to termites, vermin and mold. Available in sheets and as sectional pipe covering. For full details, write Johns-Manville, 22 E. 40th St., New York, 16, N. Y.

JM

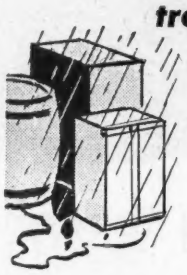
Johns-Manville
ROCK CORK

ON A ONE-WAY TICKET TO THE TROPICS



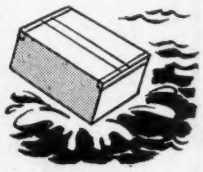
SEALED WITH SOLSEAL WATERPROOF TAPE

Excerpts from the diary of a tropics-bound food container



". . . and when it came to facing the elements, I'm here to tell you I *really* had to take it!

"It started when they stood me alongside the other containers on the freight platform (there just was no available warehouse space to keep us snug and dry), half-buried in mud, with rain pelting down on me for the better part of two weeks! . . . Then the loading dock . . . more rain and sleet, enough to make me want to fall apart from waterlogging, but I held up under it in great shape. Once on the ship I was set down in the hold, partially under water the entire trip . . . water in the hold minimizing the danger of fire under torpedo attacks.



"When I finally arrived at port of destination we didn't dock. To speed things along I was dumped into the ocean to be picked up at low tide . . . after which I was toted right up to advance positions through pelting tropical rains. You'd think that long before that I'd have burst my seams! . . . Not a bit of it. I was sealed with SOLSEAL Tape so that we could stand rain, high humidity and immersion *for weeks at a time!* And did I come through with colors flying? I'll say I did—and how!

SOLSEAL Waterproof Tape is available in 30/30/30, 60/30/30, and 60 lb. Wet Strength Kraft with Solseal adhesive. Also available string filled. Manufacturers whose containers are subject to high humidity, rain and actual immersion are urged to write for free sample coil with Solseal Solvent for testing purposes. Specify type of Solseal sample desired.

A McLAURIN-JONES Product

McLAURIN-JONES COMPANY · BROOKFIELD · MASS.

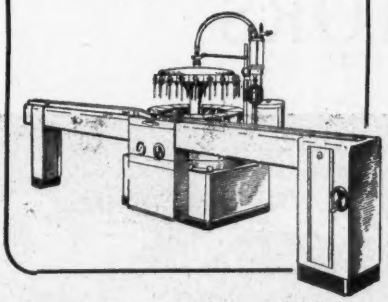
"Off the Beam" FOR THE DURATION

. . . but our Course is Charted for the Future

Completely automatic, semi-automatic, hand-fed equipment to clean, fill, close, convey jars, bottles, tins, collapsible tubes.

●

Filters Pumps
Percolators



Although "business is still ***just*** business," when peace returns to a troubled world, we predict: "Business will be ***better*** business."

. . . Preparatory to the post-bellum era, The Karl Kiefer Machine Co.—now steeped in war work—maps its course for the "tomorrows."

With the sounding of that "all clear" signal, we will resume building of machinery for packaging liquid and viscous materials—incorporating the knowledge we have gained through these strenuous times.

Now, as for more than 50 years, "We Are Thinking in Terms of Quality—Are You?"

The KARL KIEFER MACHINE Co.

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AMERICA'S GREAT AUTOMOTIVE INDUSTRY GIVES TOTAL COOPERATION FOR TOTAL VICTORY

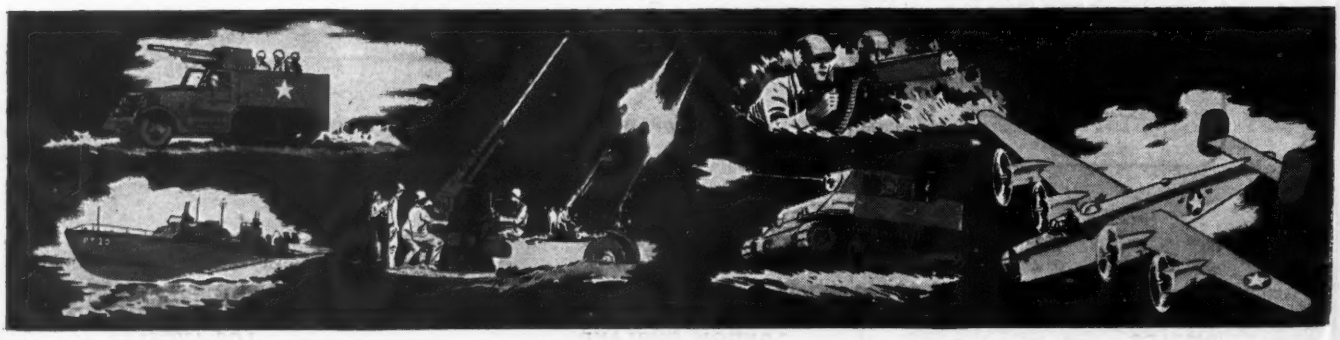
. . . with *"Work Together — Win Together"* as the universal battle cry of the day

Chevrolet always has been proud of its membership in the automobile industry—but never before quite so proud as it is today. . . . For motor car manufacturers have performed miracles on behalf of America's war effort, and they have accomplished these miracles by utilizing their skills, their experience and their resources to turn out the maximum of war material for the common cause. . . . For its own part, Chevrolet is glad to report that it is serving others, just as others are serving Chevrolet—and all for the advancement of the war effort. . . . Major contractor, building aircraft engines, anti-aircraft guns, high-explosive and armor-piercing shells, military trucks and other products for our armed forces—Chevrolet also is a major supplier, manufacturing parts by the million for more than 120 other important war producers. . . . Total cooperation—total teamwork—is the key to total victory for all of us.

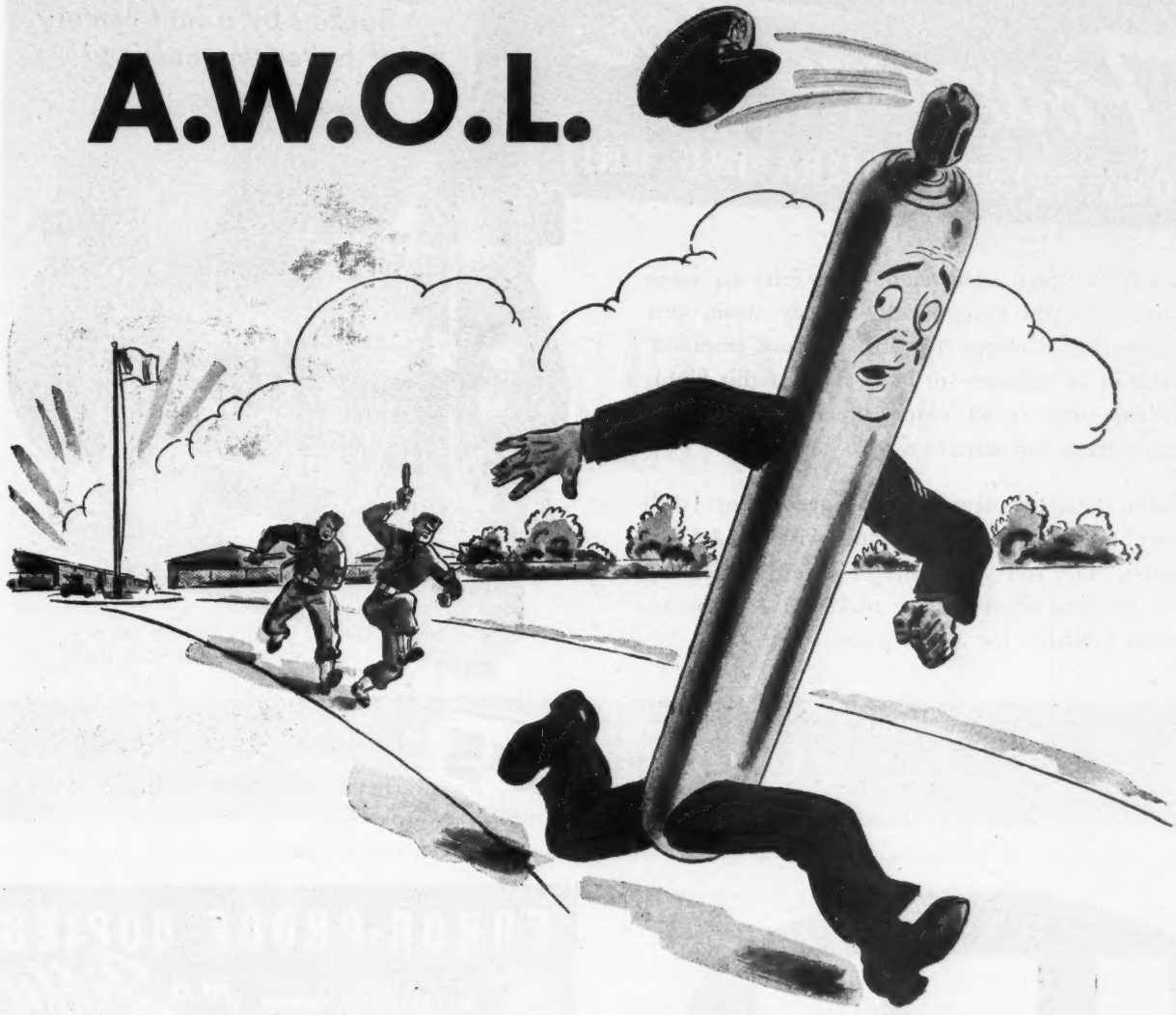
★ ★ ★

The products illustrated are only a few of the great many produced by the Automotive Industry.

CHEVROLET
DIVISION OF
GENERAL MOTORS



A.W.O.L.



SEND HIM BACK immediately to his post (Carney's Point, N. J.). You'll recognize him instantly—he's the empty "Freon" cylinder in your shop.

He's needed for war duty—to carry "Freon" to war production plants, to military bases, and to you in your job of servicing vital civilian needs.

When you return him, be sure to include that brass cap that belongs on the valve. We can't get new caps for love or money—and a cylinder without one is almost as bad as no cylinder at all.

RETURN CYLINDERS THE INSTANT THEY ARE EMPTY

KINETIC

KINETIC CHEMICALS, INC., *MAKERS OF "FREON"* SAFE REFRIGERANTS*

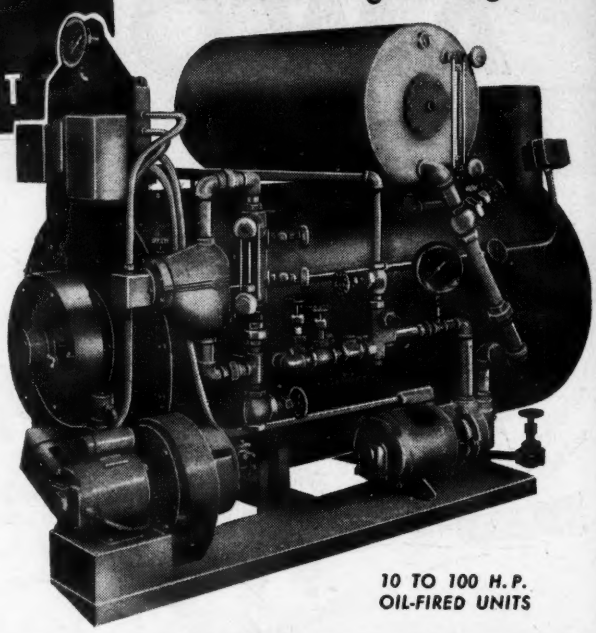
**"Freon" is Kinetic's registered trade mark for its fluorine refrigerants*

Here it is—the NEW

Powermaster

O&S STEAM GENERATING UNIT

★ Backed by a half-century of boiler engineering!



10 TO 100 H. P.
OIL-FIRED UNITS

Sturdy, compact, lightweight—this fully-automatic unit gives you exceptionally speedy steam production. It develops 100 lbs. pressure from 60° water in 18 minutes—or less! Back of this highly efficient unit is 58 years' experience in boiler engineering and manufacture.

Right now, the new unit is tagged "For Uncle Sam" . . . and some for plants with an AA2 or better. But you will want to investigate now—for the day when Victory makes O & S boilers again available for all purposes.

ORR & SEMBOWER INC. READING • PENNSYLVANIA

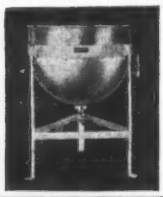
O&S Builders of Better Boilers Since 1885

LEE

Dependable Processing

KETTLES—anywhere

With Lee Stainless Steel Kettles on the job you are sure of better, faster processing. They're durable, corrosion resistant, easy to clean,—thoroughly dependable—that's why they're top favorites in the service of our armed forces and essential industries everywhere. May we send you our descriptive catalog?



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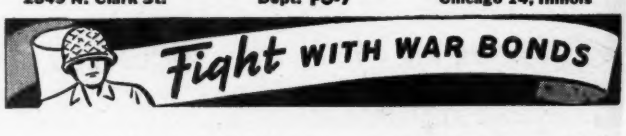
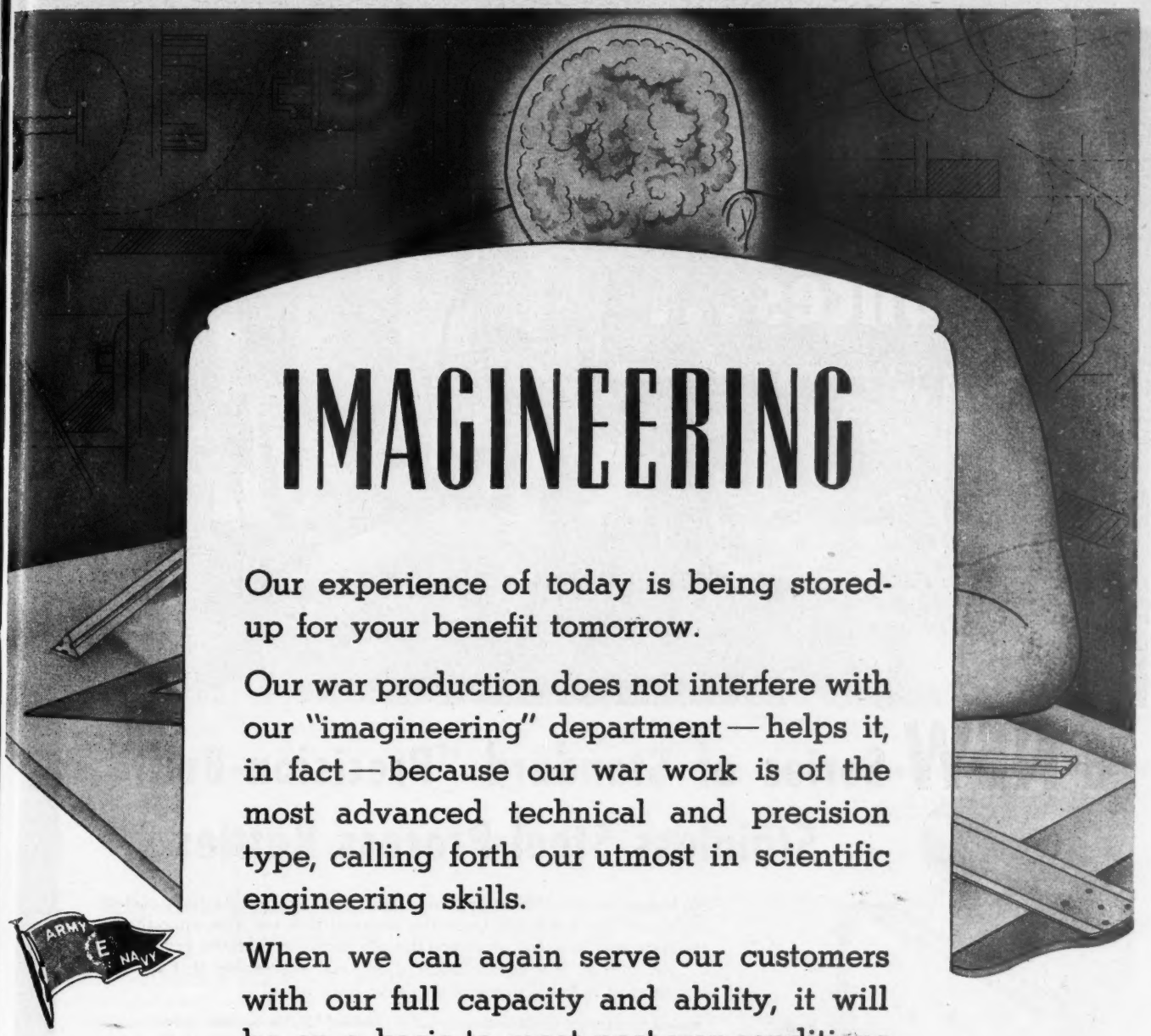




IMAGINEERING

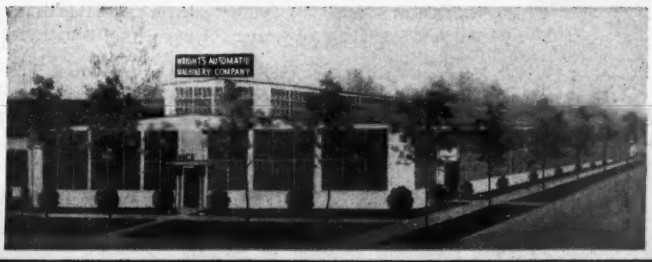
Our experience of today is being stored-up for your benefit tomorrow.

Our war production does not interfere with our "imagineering" department — helps it, in fact — because our war work is of the most advanced technical and precision type, calling forth our utmost in scientific engineering skills.

When we can again serve our customers with our full capacity and ability, it will be on a basis to meet post-war conditions with the latest, most modern up-to-the-minute equipment in our field.

And in the meantime remember—there are no priorities on SERVICE at Wright's.

ESTABLISHED • 1893 •

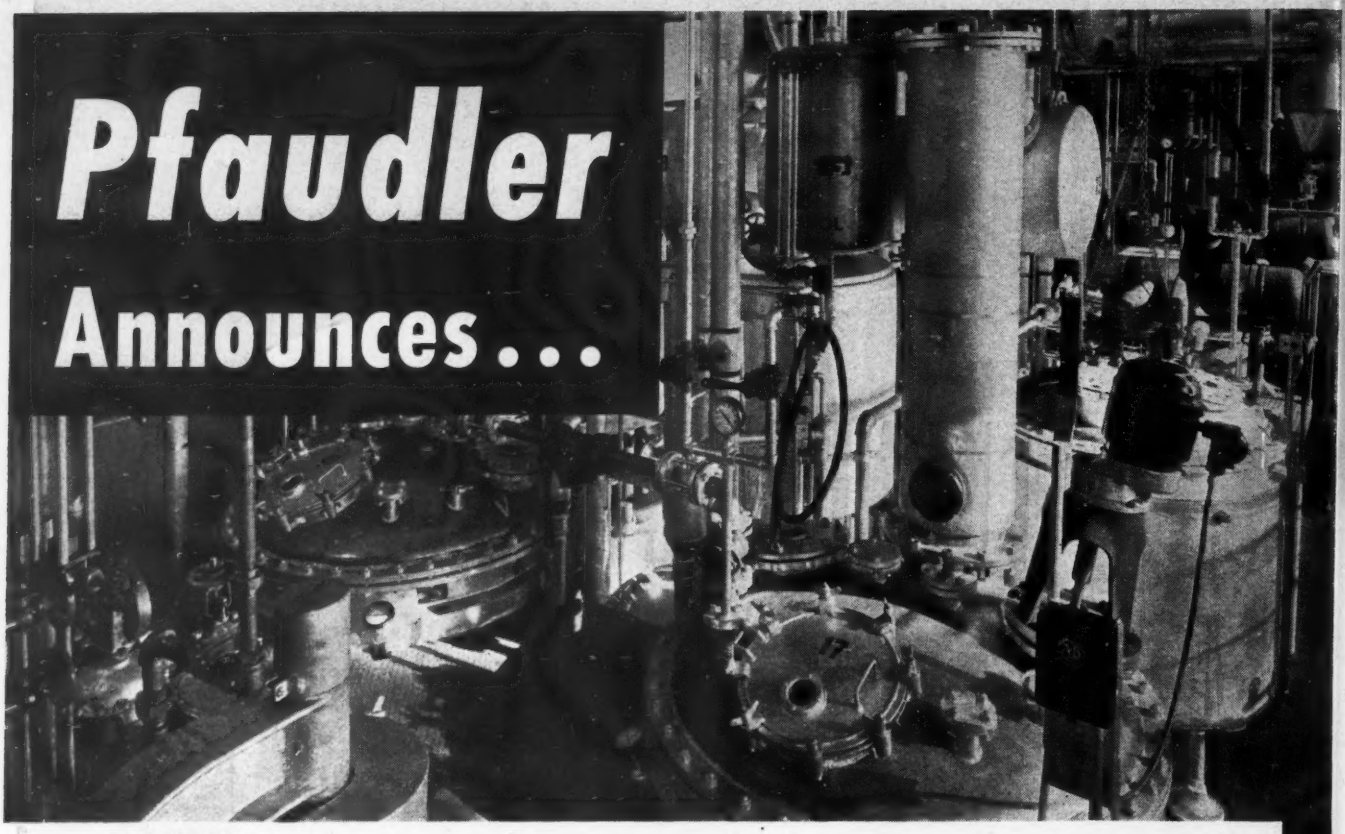


PACKAGING ENGINEERS

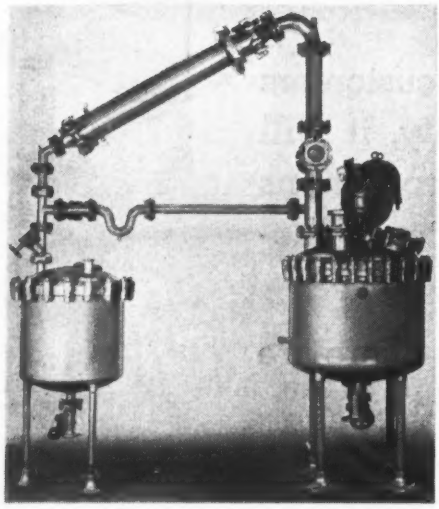
WRIGHT'S AUTOMATIC MACHINERY COMPANY

DURHAM CABLE ADDRESS YONWRIGHT NORTH CAROLINA, U. S. A.

Pfaudler Announces...



a NEW Series of Standard "Precision-Built" Stainless Steel Process Kettles



No longer is each Pfaudler "Precision-Built" Process Kettle a custom built unit. So great has been the demand that we now announce a standardized line that gives you the advantage of quantity production . . . yet with such a combination of optional accessories that you still obtain most of the features of a custom-built vessel.

RANGE OF SIZES—5 to 500 gallons inclusive—for laboratory, pilot plant and production work.

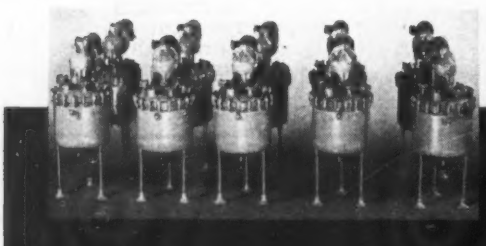
CONSTRUCTION—All welded stainless steel liners (polished or unpolished) with all-welded mild steel jackets for heating or cooling.

PRESSURES—Vessels built for internal pressures ranging from 17 to 75 P.S.I.; jacket pressures from 23 to 80 P.S.I., depending on size and whether unit is built of polished or unpolished stainless steel.

AGITATION—Motor or pulley driven stainless agitators of various types—anchor, double motion, propeller, impeller, turbine, etc. Spiral bevel gear drives are especially rugged and quiet running . . . built for super loads and wide range of speeds.

TOP HEADS—Models up to 150 gallons provided with top heads. Welded top heads on sizes over 150 gallons with clamps available as alternate.

NOZZLE OPENINGS—All nozzle openings ranging from 1¼" to 8" feature a loose type flange for greater strength and flexibility, permitting orientation of bolt holes for pipe line connections. All flanged faces surface ground to obtain accurate seats for gaskets.



These are but a few of the highlights of this series. Bulletin 823 describes the entire "Precision-Built" line, including stainless steel tubular condensers, jacketed evaporating pans, stainless steel fabricated pipe and fittings, etc. A copy of this new booklet awaits your request. Please make requests on company letterhead.

PFAUDLER

THE PFAUDLER CO., Rochester 4, N. Y. Branch Offices: 330 West 42nd St., New York 18, N. Y.; 1442 Conway Bldg., Chicago 2, Ill.; 1325 Howard St., San Francisco 3, Calif.; 455 Paul Brown Bldg., St. Louis, Mo.; 7310 Woodward Ave., Detroit 2, Mich.; 1318-1st National Bank Bldg., Cincinnati 2, Ohio; 1228 Commercial Trust Bldg., Philadelphia 2, Pa.; 751 Little Bldg., Boston 16, Mass.; 1034 Washington Bldg., Washington 5, D. C.

Why detergency *plus heat-proofing* is needed to keep heavy duty engines clean

● STANOLUBE H. D. is a "heat-proofed" oil. What that means is described by the diagrams on this page. What it means in longer engine life and lower maintenance is written in the records of millions of miles of heavy duty operation rolled up by trucks and buses, contractors' equipment, and the jeeps, trucks, and tanks of Uncle Sam.

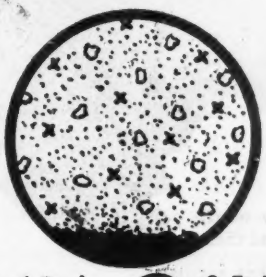
In fact, it is only because of the vital part your civilian fleet plays in the war effort that Stanolube H. D. is made available to you. Take advantage of the opportunity. Let Stanolube H. D. help you solve the biggest problem you have today—that of making your equipment last for the duration.

Ask a Standard Oil Man to help you test Stanolube H. D. See for yourself how persistent deposits in heavy duty gasoline and Diesel engines disappear when Stanolube H. D. takes over. Write to any local Standard Oil Company (Indiana) office, or 910 S. Michigan Ave., Chicago 5, Illinois. In Nebraska, write Standard Oil Company of Nebraska at Omaha 2.

These pictures tell the story

Engine deposits caused by oil contamination

Most troublesome engine deposits are caused by the gradual contamination of motor oil in use. The contaminants usually found in conventional oils are shown in the diagram below.



1. Road dust.

2. Fuel soot or carbon that has blown by piston rings.

3. Oil oxidation products caused by excessive engine heat and agitation of oil in the presence of oxygen.

NOTE: Water is a contaminant frequently found in motor oil. It results from leakage or condensation, and produces water sludge which takes many forms—from a slimy mass to deposits easily confused with those caused by dirt or oil failure. Water sludge occurs more frequently in cold-running engines, such as in delivery trucks. It can be eliminated, not by changing the type of oil, but only by correcting the mechanical condition causing it.

Dust and carbon particles form heavy deposits in ring grooves and crankcases, and on valve stems, rocker arms, oil screens, and filters.

Oil oxidation products are of many types. Some cause rapid increase in oil viscosity. Others, under certain conditions, cause corrosion. But by far the most prevalent and troublesome oil oxidation product is that causing a varnish or lacquer-like coating on pistons, cylinders, and valve stems. This type of product is not only troublesome itself, but it acts as a binder for dust and carbon particles.

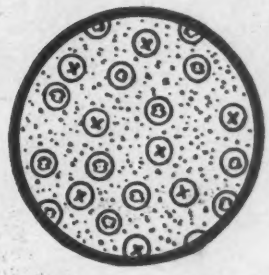
★ ★

heat-proofed **Stanolube H.D.**

★ ★

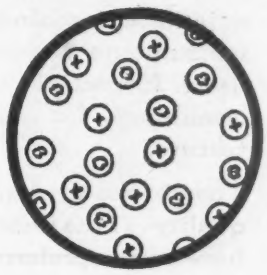
Oil is ammunition . . . Use it wisely

Effect of detergency on contaminants



Detergency in motor oil eliminates deposits by preventing fine dust and carbon particles from settling out of the oil. In effect, the detergent surrounds the contaminants with a film which prevents them from adhering to each other and to metal parts of the engine. It holds them in suspension until they are removed by the filter or drained from the crankcase. But detergency alone does not protect against oil oxidation, which causes varnish forming products, viscosity increase, and corrosion.

Detergency plus heat-proofing or oxidation-inhibiting



To eliminate all troublesome deposits—particularly those occurring under extremely heavy duty service in gasoline and Diesel engines—a new type of motor oil was developed by Standard Oil. First, a petroleum stock was selected with great resistance to oxidation. Then, by solvent refining, the unstable hydrocarbons—those easily oxidized—were removed as completely as possible. Finally, the remainder were stabilized by the addition of a special oxidation-inhibitor and detergent developed in Standard Oil laboratories.

This oil—"heat-proofed" STANOLUBE H.D.—slows down the rate of oil oxidation to the minimum. The detergency becomes doubly effective in preventing deposits from other contaminants. The mild solvency or purging action of Stanolube H. D. gradua'ly removes deposits formed prior to its use and has cleaned up many a dirty engine over a period of time.

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

★ **FLEET CONSERVATION SERVICE**

It is general foundry practice to re-use black sand. The trick, however, lies in the way it is reconditioned . . . the way foreign material is removed.

The sand used in "K" fitting manufacture is reprocessed to an unusual degree by special automatic machinery controlled by special instruments developed by our own engineers. Inspections every thirty minutes for cleanliness, for moisture content and for texture.

Therein lies the explanation for "K" fitting quality . . . the reason "K" cast-iron fittings have been a preferred make since 1887.

THE "K" LINE IS A COMPLETE LINE . . . ESPECIALLY FAST SERVICE ON SMALLER SIZES

Standard and special fittings up to 24". Enlarged facilities and ample pig and scrap assure prompt shipment. Standard, extra heavy flanges, companion flanges. For steam, drainage, sprinkler . . . wherever cast fittings apply. Write for catalog at once.

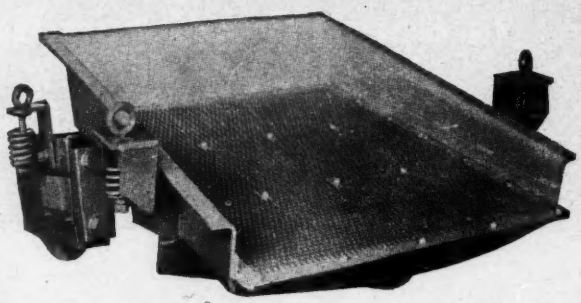
KUHNS BROS. COMPANY, DAYTON, OHIO

Combined marketing facilities on both "K" cast-iron fittings and M.I.F. malleables. Complete stocks at both Dayton, Ohio, and Branford, Conn.

SYNTRON

"Pulsating Electromagnet"

VIBRATING SCREENING FEEDERS



The Screening Feeder shown above is one of twelve in a dehydrating plant.

Used for washing and screening fines out of diced vegetables, and also to control the filling of the dehydrating trays.

Screening Feeders are also used to both remove foreign objects from food materials, and control their flow to processing machines—pulverizers, driers, mixers, weight packers, etc.

Available in various sizes, capacities and styles.

Write us about your problem.

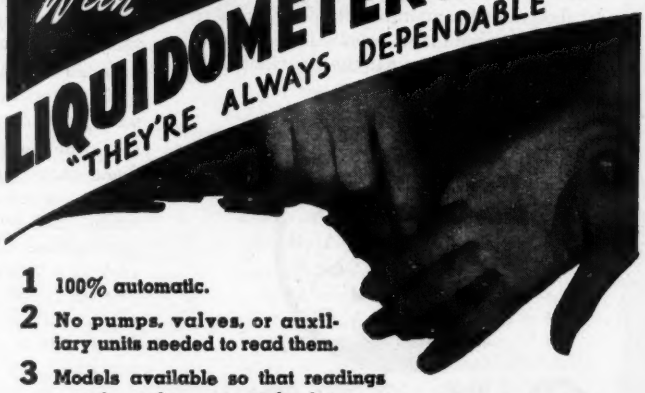
SYNTRON CO.

460 Lexington Ave. Homer City, Pa.

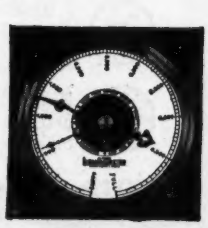
5 Reasons Why We Measure Our Valuable Stored Liquids With

LIQUIDOMETER *Tank Gauges*

"THEY'RE ALWAYS DEPENDABLE"



1. 100% automatic.
2. No pumps, valves, or auxiliary units needed to read them.
3. Models available so that readings can be taken remotely from or directly at the tank.
4. Accuracy unaffected by specific gravity of tank liquid.
5. Approved for gauging hazardous liquids by Underwriters' Laboratories and other similar groups.



Write for complete details

THE LIQUIDOMETER CORP.

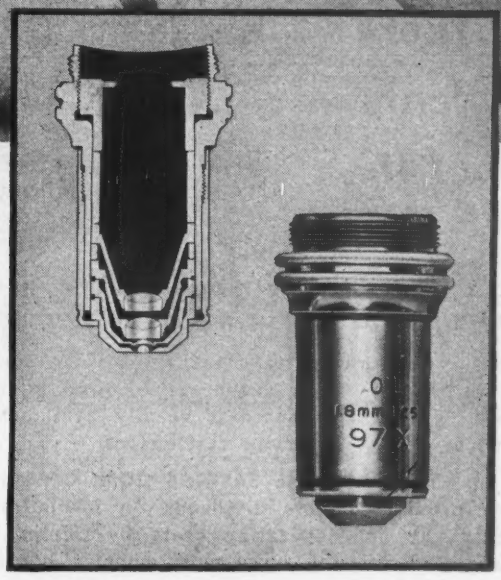
38-14 SKILLMAN AVE., LONG ISLAND CITY, N.Y.

Accuracy that Counts on all Fronts

At first glance there would seem to be little relationship between an intricate, ten-foot long height finder and a microscope objective with lenses of less than one millimeter in radius. Yet both are the products of the same eyes, the same facilities, the same standards of accuracy, the same experience. Both are aiding in America's war effort. Both are products of Bausch & Lomb.

The lens computing and grinding skills that for years have produced the minute, exceedingly accurate lens components of the microscope objective are today also being employed in the production of height-finders and gunfire control instruments that are helping America's armed forces to win an earlier Victory.

This quantity production of precision optical instruments, pioneered and fostered by Bausch & Lomb through years of peace, has become a highly valued asset to an America at war. Here again, because of its wartime accomplishments, Bausch & Lomb will be able to extend its optical services to peacetime pursuits when Victory is won.



Bausch & Lomb Oil Immersion Objective— 97X-N.A. 1.25

For Bausch & Lomb Instruments essential to Victory—priorities govern delivery schedules.

BAUSCH & LOMB

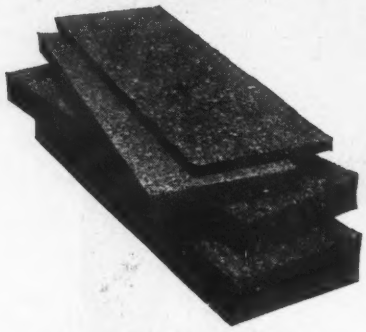
OPTICAL CO. • ROCHESTER, N. Y.

ESTABLISHED 1853

AN AMERICAN SCIENTIFIC INSTITUTION PRODUCING OPTICAL GLASS AND INSTRUMENTS FOR MILITARY USE, EDUCATION, RESEARCH, INDUSTRY AND EYESIGHT CORRECTION

CORK

...there's plenty of it



. . . . . so save money and conserve equipment by using it on every job

There is no cork shortage today. In fact, cork stocks in the United States are at an all-time high. As a result, Novoid Corkboard is readily available for all kinds of use . . . without restrictions.

HERE ARE THE SAVINGS CORK OFFERS

Cork provides double dividends on insulation investments. It cuts operating costs by minimizing heat leakage, so freezing units work shorter hours. This, in turn, brings a second advantage that is especially important these days . . . reduced wear and tear on equipment. Securing new equipment is a big problem, and cork helps keep your present equipment running longer.

So, plan on cork for your next cold room job. You can count on it for years of efficient service and complete freedom from maintenance expense.

OTHER NOVOID INSULATIONS

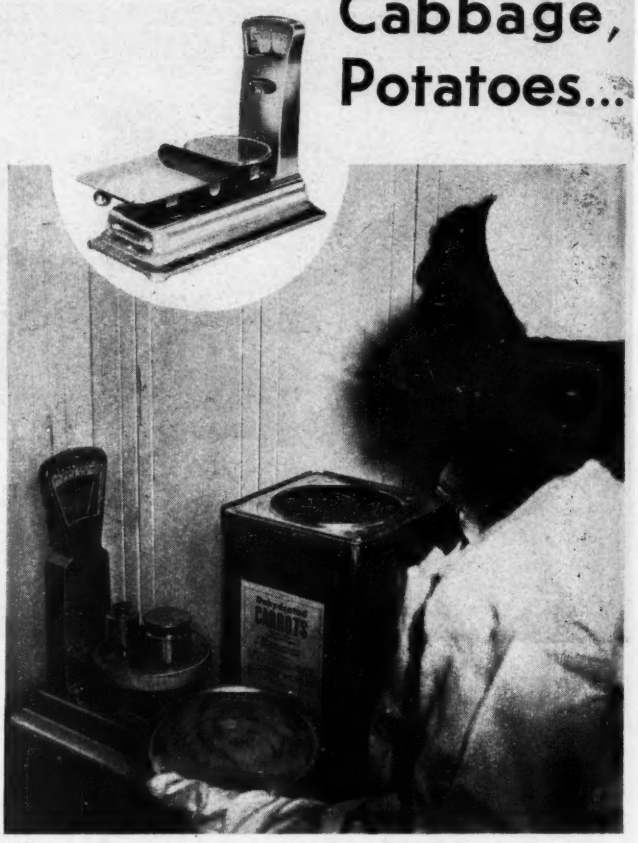
Also readily available today is Novoid cork covering and cork fitting covers. These light-weight cork coverings eliminate cold line condensation and reduce refrigeration costs.

For insulation jobs where your budget is limited, use Novoid Mineral Wool Board. It's a light-weight, efficient low-temperature insulation that is resistant to moisture . . . easy to install. Get complete information on all Novoid insulation materials by writing today to Cork Import Corporation, 330 W. 42nd St., N. Y. C.

NOVOID INSULATION

Corkboard • Cork Covering • Mineral Wool Board

When You Package Dehydrated Carrots, Cabbage, Potatoes...



Check - weighing dehydrated carrots in the plant of the Miller Fruit Co., Inc., Healdsburg, California.

do it the Exact Weight Way.....

Dehydration takes out moisture . . . leaves a concentrated product . . . adds materially to the value of the finished product. When you package accurate net weights are important for profitable operation. Dehydrated products must be handled in ounces not pounds. What is required is handling a high value product in small containers with speed and accuracy. This is the task of high-speed, fraction-ounce accuracy EXACT WEIGHT Scales which for more than twenty-seven years have handled volume food production successfully for thousands of food processors from coast to coast.

Write for details for your plant.

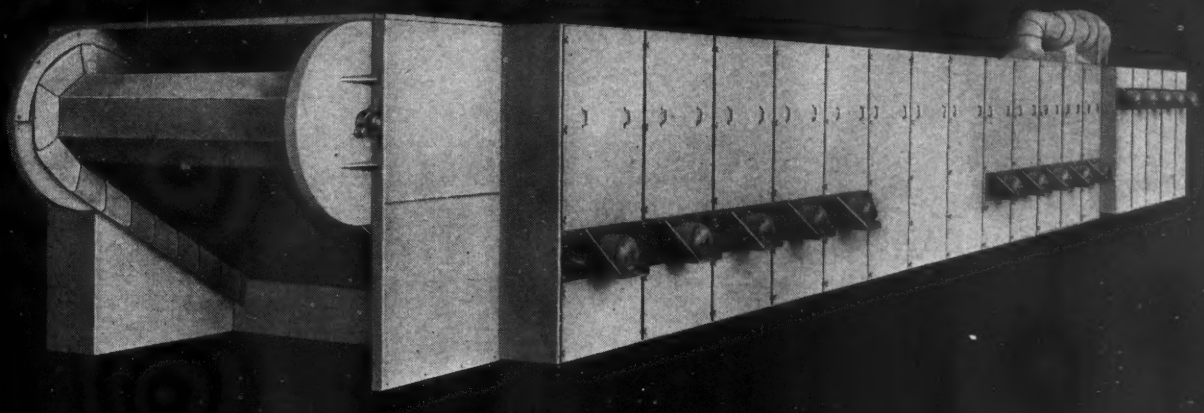
THE EXACT WEIGHT SCALE COMPANY

21 W. Fifth Ave., Columbus 8, Ohio

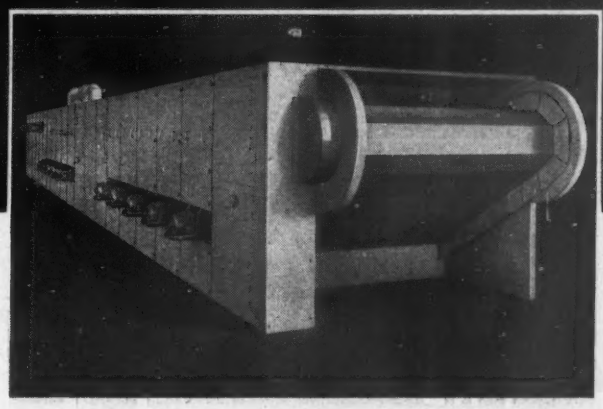
Dept. T, Toronto, Canada

Exact Weight Scales

The HUNTER continuous dehydrator



FOR AUTOMATIC,
UNIFORM PRODUCTION



Illustrations show the new HUNTER Continuous Food Dehydrator. It comes completely equipped with all necessary controls for maintaining necessary temperatures and humidity. It is adaptable to continuously dehydrating a wide variety of food products.

The operation of this new, modern HUNTER unit is completely automatic from the time the blanched product is delivered to the feed end of the dryer until the completely dehydrated product is delivered to the proper containers.

For full details on this modern unit write to HUNTER ———

JAMES HUNTER MACHINE CO.
NORTH ADAMS, MASSACHUSETTS
FOUNDED 1847

BAKER
ENDURING QUALITY

—AND SINCERITY

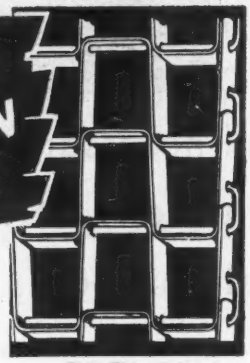
BAKER machines are constructed of steel, iron, copper, skill—and sincerity. Thus has BAKER built its 38-year reputation for dependability.

BAKER ICE MACHINE CO., INC., Omaha, Neb.

BAKER COMMERCIAL AND INDUSTRIAL REFRIGERATION

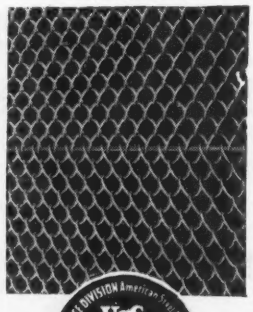
PREVENT PRODUCTION DELAYS...

... with conveyor belts that can stand the gaff



Flat Wire Belts

Chain Link Belts



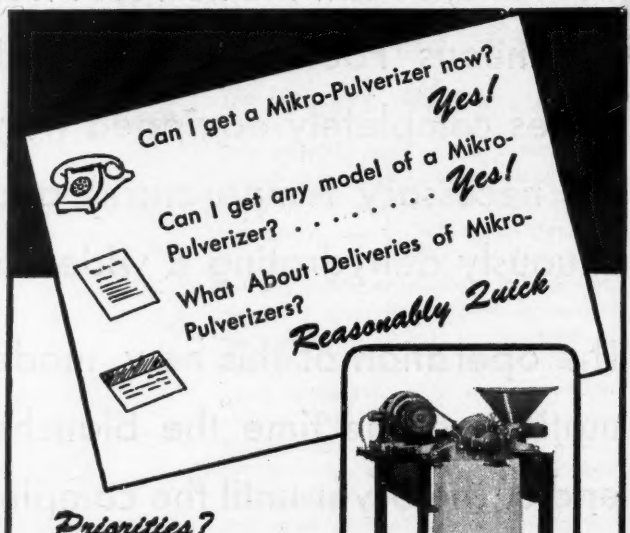
CYCLONE Metal Conveyor Belts have the strength to withstand heavy loads—quick stops and starts. Water, steam, and temperature changes do not harm them. Thoroughly sanitary, heat-resistant, porous. These are good reasons why Cyclone Belts—long used to convey all types of products—are proving so practical for use in food dehydration.

U·S·S Cyclone Belts are available in Flat Wire and Chain Link types—in a variety of weights, widths and sizes of mesh. Write us for further information and prices.

CYCLONE FENCE DIVISION
(American Steel & Wire Company)
Waukegan, Ill. · *Branches in principal cities*
United States Steel Export Co., New York

USS CYCLONE Red Tag METAL CONVEYOR BELTS

CYCLONE *Metal Conveyor Belts* UNITED STATES STEEL


Can I get a Mikro-Pulverizer now?
Yes!
Can I get any model of a Mikro-Pulverizer? . . . . . Yes!
What About Deliveries of Mikro-Pulverizers?
Reasonably Quick

Priorities?

Naturally you'll need a priority to get a Mikro-Pulverizer. But the important thing is; given priorities *we* can deliver.

Write for 32 page catalog or submit your materials for free test grind.

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97 Chatham Road, Summit, N. J.

MIKRO-PULVERIZER

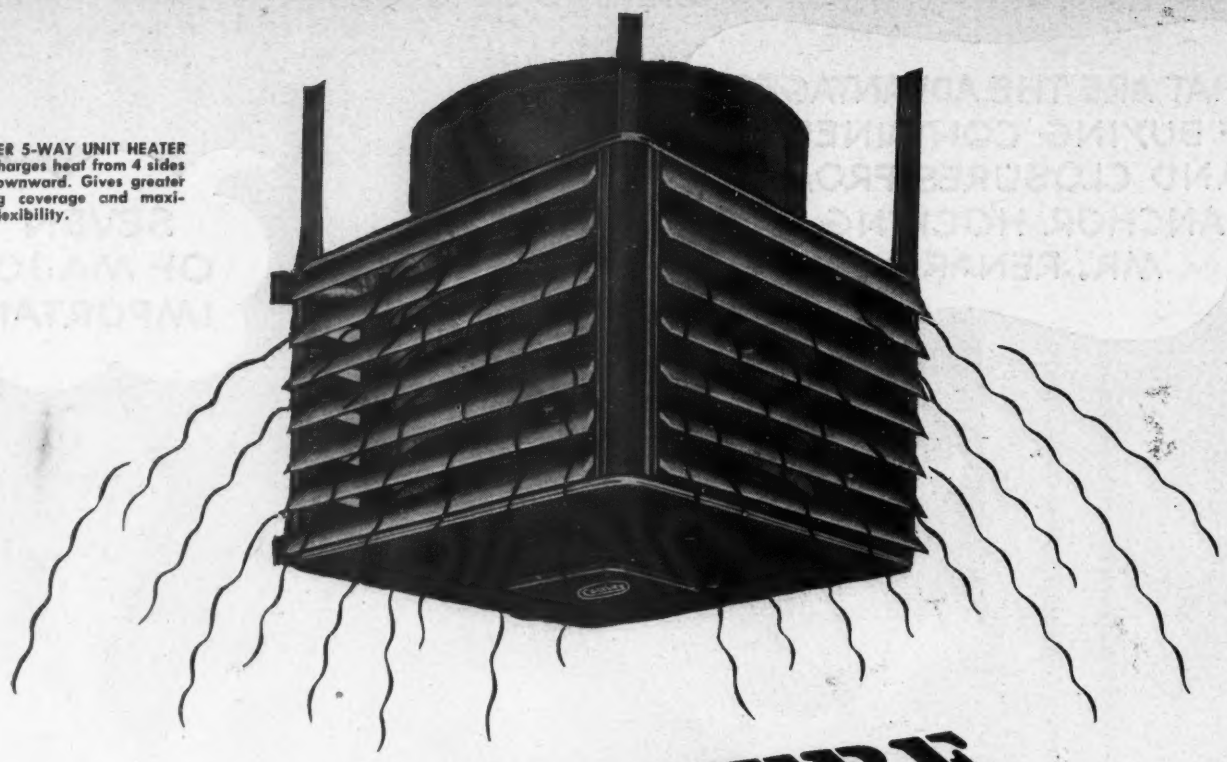
First, a complete line of standardized glass containers for every packaging need. *Second*, a line of fourteen metal and molded closures, and sealing machines. *Third*, coordinated service through a single source of supply. *Fourth*, Experimental and Research Laboratories to help solve your packaging problems. *Fifth*, an Engineering Division to help you set up your production lines. *Sixth*, a stable business organization, adequately backed, whose history of steady, successful growth gives you assurance of quality and reliability. *Seventh*, the experienced counsel constantly available to you through Anchor Hocking's field representatives, all of whom have spent many years servicing packers' and manufacturers' container and closure needs.

ALBERT RENARD, one of Anchor Hocking's ablest and most popular men, has been a member of the Anchor Hocking family for 24 years.

ANCHOR HOCKING

GLASS & CAPS

ANCHOR HOCKING GLASS CORPORATION LANCASTER, OHIO



CARRIER 5-WAY UNIT HEATER —discharges heat from 4 sides and downward. Gives greater heating coverage and maximum flexibility.

HEAT WHERE YOU WANT IT

War plant workers, especially women and older employees, must be kept comfortably warm by adequate heating and ventilating facilities if they are to work at maximum efficiency during winter months.

One of the reasons why absenteeism increases so sharply is the prevalence of colds resulting from lack of proper heating. Cold fingers, too, hinder war production.

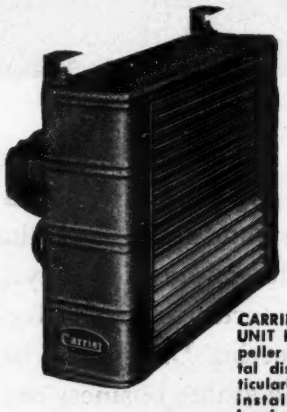
Carrier Unit Heaters and Heat Diffusers offer many important advantages in flexibility of arrangement, efficiency and economy of operation, and quick, simple installation. They supply plenty of warm air directly to working areas just where heat is needed. They save fuel and floor space—they save in first cost, installation, operating, and maintenance cost.

A wide range of propeller and centrifugal fan type units, for steam and hot water, is available for every purpose.

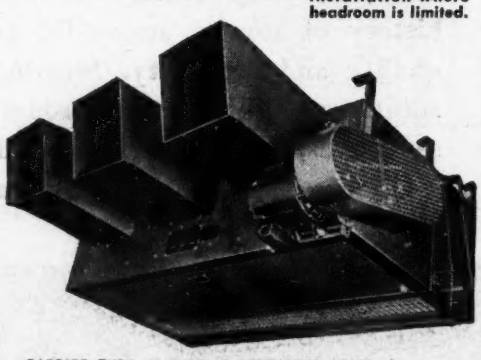
Now is the time to check on the heating needs of your plant for next winter. If departments or machinery have been relocated, changing working areas . . . if old heating equipment is obsolescent . . . if workers were not comfortably warm last winter—you can use Carrier unit heating and heat diffusing equipment to advantage.

Carrier engineers will be glad to make a recommendation regarding type of equipment to best serve your requirements.

CARRIER CORPORATION, Syracuse, N. Y.



CARRIER TYPE 46 E UNIT HEATER—propeller fan; horizontal discharge. Particularly suitable for installation where headroom is limited.



CARRIER TYPE 46 R HEAT DIFFUSING UNIT—for economical heating and ventilating of large enclosures. Designed for horizontal suspension from ceiling or truss-work, floor-mounting, or vertical suspension.

Carrier
UNIT HEATING

ARMY E NAVY

The Snowball that Rolled Uphill!

It was a steep and rugged hill that U. S. aluminum production had to climb back in 1940. The total Axis output was twice our capacity. France was doomed. England was fighting for its life.

But that year, men of vision in the aluminum industry saw what was ahead and began pushing. It was tough going. But swiftly, surely, the snowball of aluminum production rolled uphill.

Reynolds has contributed much to this great effort. Long before Pearl Harbor, we staked all our resources to provide a new source of aluminum—to mine our own Bauxite ore—to build mammoth new factories—to turn out hundreds of millions of pounds of finished metal.

Spurred by Reynolds foresight and daring, the snowball has rolled over the top of enemy output. Now, with the tough uphill battle won, this shining snowball is gathering momentum to crush the Axis.

And when our boys come flying home from victory, they'll fly straight into a new Age of Aluminum . . . a plentiful supply of the miracle metal that *does so many things so much better.*

REYNOLDS METALS COMPANY

General Offices, Richmond, Va.
Parts Division, Louisville, Ky.
37 PLANTS IN 13 STATES

"WHEN WE ASSUMED THE SOLDIER, WE DID NOT LAY ASIDE THE CITIZEN"

So Spoke GEORGE WASHINGTON in his Message to The Provincial Congress in 1775

And George Washington . . . soldier, statesman, businessman and citizen . . . knew what he was talking about! A nation at war cannot overlook civilian needs, and the day when civilian economy will again predominate.

That's good advice today, too . . . even though it's 168 years old! We're in the fight again, and busy with essential war and civilian production. Someday it will be over . . . then, how will you stand? Will you be ready to meet the demands of normal, peacetime competition, with ideas, products, equipment and prices that are BETTER? That's what it's going to take.

Take a tip from George Washington, and think about this, NOW!

We have nothing to sell at the moment because we're busy on war work, too! But our Engineers have done plenty of thinking and have worked out some new ideas that they are ready to discuss with you...ideas that will make HOTTMANN Mixing Equipment more helpful to you than ever before.

And when the war is over, orders will be filled in the order in which we receive them now.

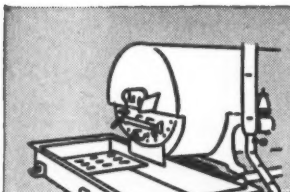
POSTWAR BACKLOGS..?

Backlogs are peacetime as well as wartime problems. And every time you hear of one you know that there is someone on the "waiting list" for things that are in demand. There is only one line of HOTTMANN Mixing Equipment, and it has been held in the very highest regard by leaders in the Food Processing Industry for a quarter of a century.

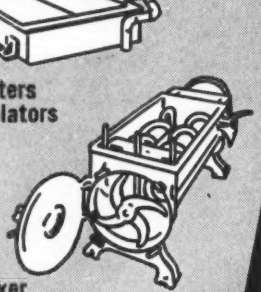
We want to take care of as many as possible when this war is over. Therefore, you'll understand why we suggest that you plan for tomorrow NOW. Consultation is invited.

Put Your Mixing Problems up to

HOTTMANN

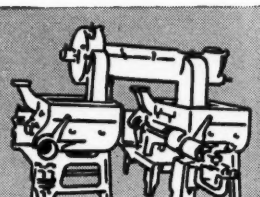


Fat Melters and Percolators

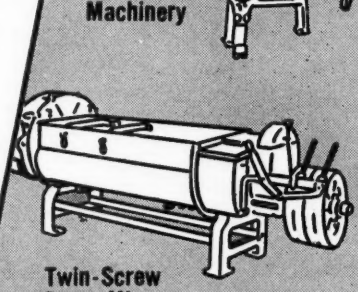


Kutmixer (Combined Cutter and Mixer)

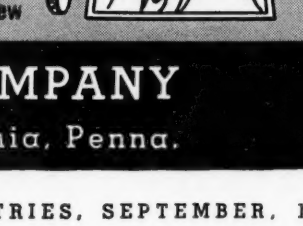
Improved Catch Basin



Yeast Machinery



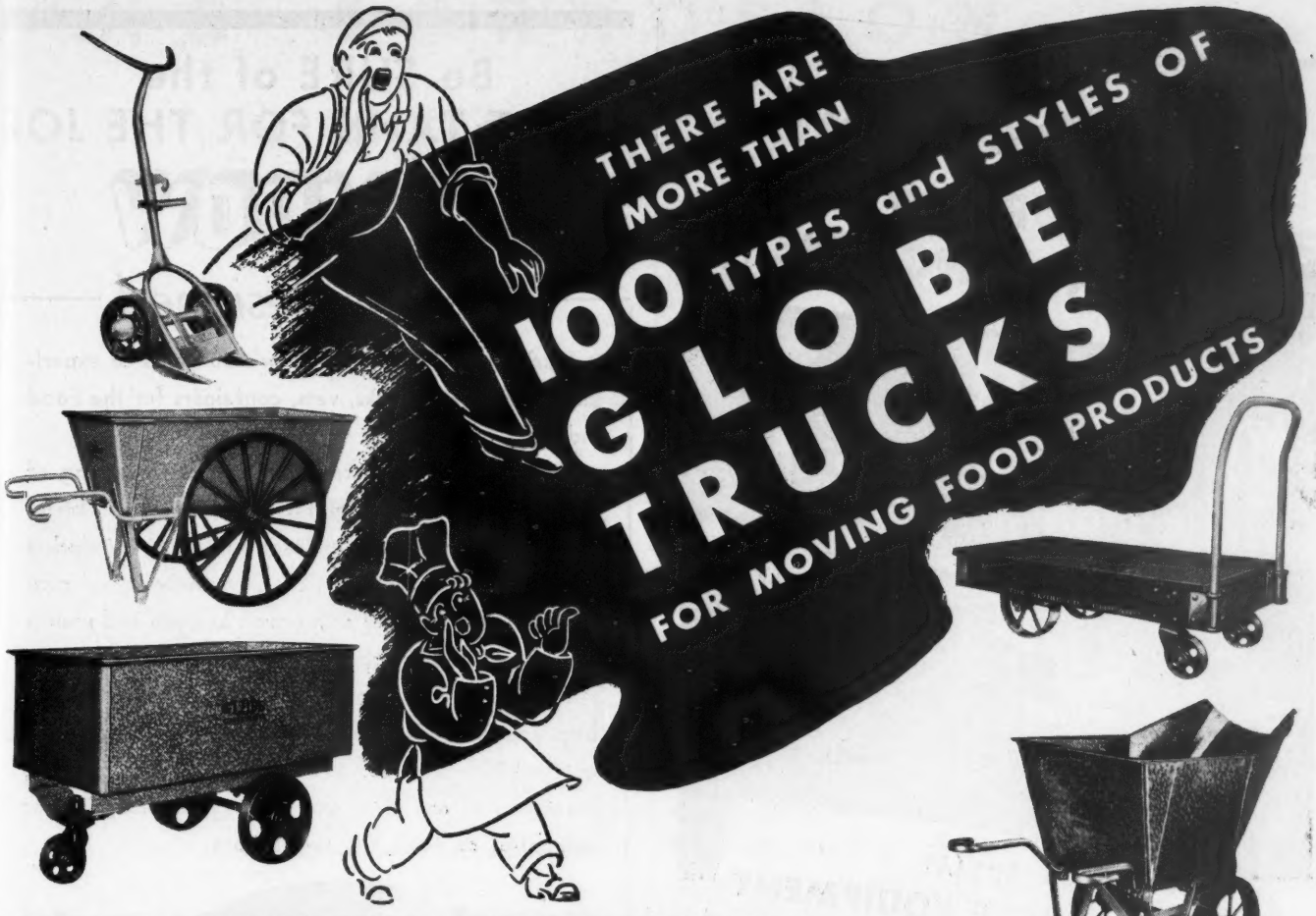
Twin-Screw Super Mixer



Mixer, Interior view

THE HOTTMANN MACHINE COMPANY

3325-47 East Allen Street • Philadelphia, Penna.



THE RIGHT TRUCKS *help you* CONTROL QUALITY

Globe trucks for practically all food handling needs are designed to give you every advantage in the movement of raw or processed foods.

You get complete sanitation, for Globe trucks are made with sanitary surfaces, shelves, racks, and platforms. They are easy to keep clean.

Each truck is built especially for the particular job intended. Where necessary, corners are rounded and shelves are removable. Seams are all welded—no bolts or rivets.

Globe trucks are balanced, easy running, sturdily built, and there is a type for every food plant need.

Confer with us about your truck needs. Because the Globe line is extensive you will find just the type of sanitary, durable, and economical equipment to fit in with your manufacturing improvement program. Our prompt deliveries have surprised many, even in these times.

Write for full information.

28 YEARS DESIGNING SPECIALIZED TRUCKS FOR THE FOOD INDUSTRY

THE GLOBE COMPANY

4000 PRINCETON AVENUE CHICAGO, ILLINOIS

You can build YOUR OWN PACKAGING LINE

with TRIANGLE EQUIPMENT

THE compact, economical packaging line illustrated, virtually tailor made to the user's requirements, is typical of the many possible combinations of Triangle equipment. The Triangle Carton Gluer, Elec-Tri-Pak Weigher, Carton Sealer and Collector Table shown are all individual standard units.

For your needs, Triangle engineers will help you choose from many models of Elec-Tri-Pak Weighers, the world's most complete line of Volumetric Fillers, a complete range of Carton Sealers and all types of accessory equipment to provide you the finest possible packaging installation.

For high speed, completely automatic installations, Triangle offers you "Elec-Tri-Line" packaging, the system second to none.

Discuss your packaging requirements with Triangle — write today and ask for literature.

ARMY E NAVY

TRIANGLE PACKAGE MACHINERY CO.

NO. SPAULDING AVENUE. CHICAGO

Be SURE of the RIGHT TANK FOR THE JOB

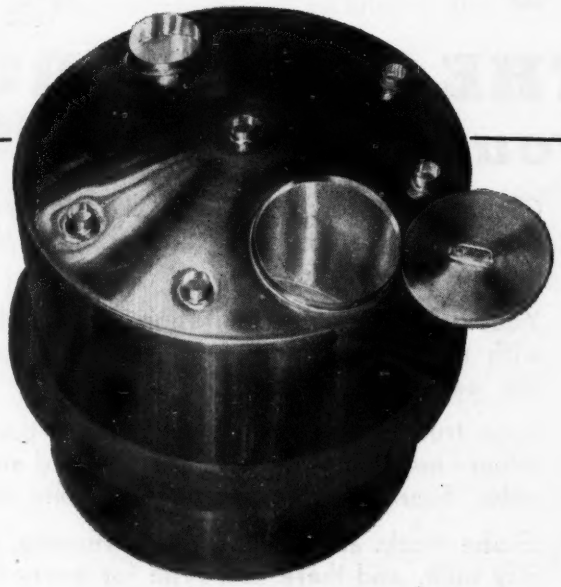
DAMROW

Custom-designed

It's YOURS to use—Damrow's 30 years of experience engineering tanks, vats, containers for the Food Industry!

Whether you need standard vats, or something of unusual shape, size or metal for a special problem, you'll find the answer in Damrow's skill, knowledge and production facilities . . . Custom-Designed containers built only after a thorough analysis and understanding of YOUR specific need.

Let us show you how this special engineering can help you to profitable and economical containers for every use — storage, processing, mixing, cooking, blanching or any other use. Just send blueprint for estimates, or write for suggestions.



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ALL INDUSTRY

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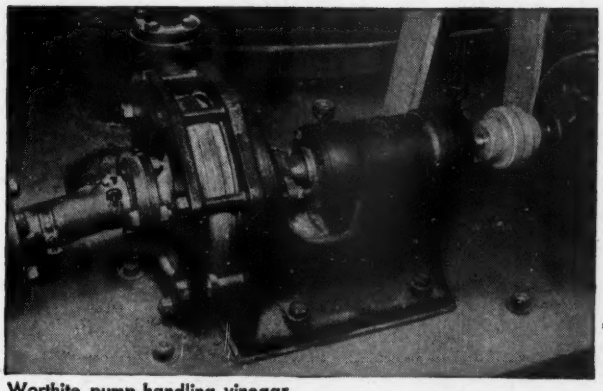
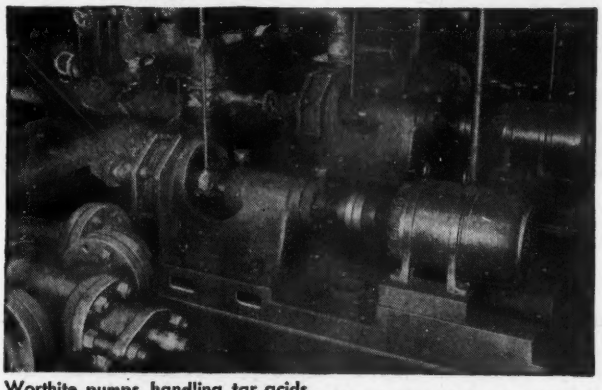
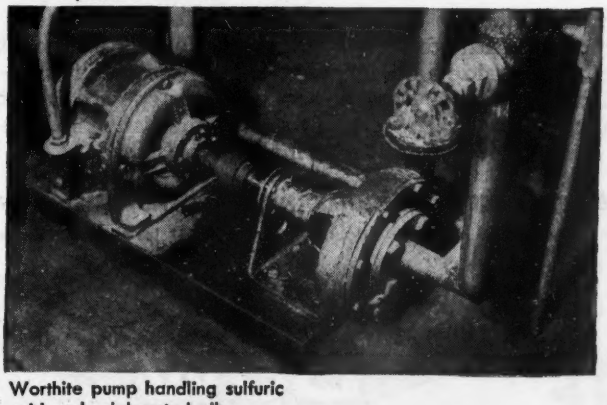
» NO CONTAMINATION
» NO OUTAGES
with WORTHITE



Worthite pump handling vinegar in a food products plant



Worthite pumps handling tar acids and napthaline at 200°—230° F



Worthite pump handling sulfuric acid and sulphurated oil

CP3-B

PUMPING EQUIPMENT

IF your processing involves pumping almost any kind of corrosive liquor you'll find this alloy, WORTHITE, as used in Worthington Pumps, will give you long, trouble-free service. It is already widely used in many industries—explosives, dyestuffs, acid manufacture, fertilizers, paper, pulp, petroleum, coke by-products, metal refining, pigments, plastic, rayon and food products. Other important uses are being continuously found.

WORTHITE is a complex alloy jointly developed by the metallurgists of Lebanon Steel Foundry and Worthington Pump and Machinery Corporation.

WORTHITE pumps are available to those processors whose war production activities give them priority.

Our descriptive bulletins on WORTHITE pumping equipment offer ideas and information which you can use in planning new or expanded processing operations.

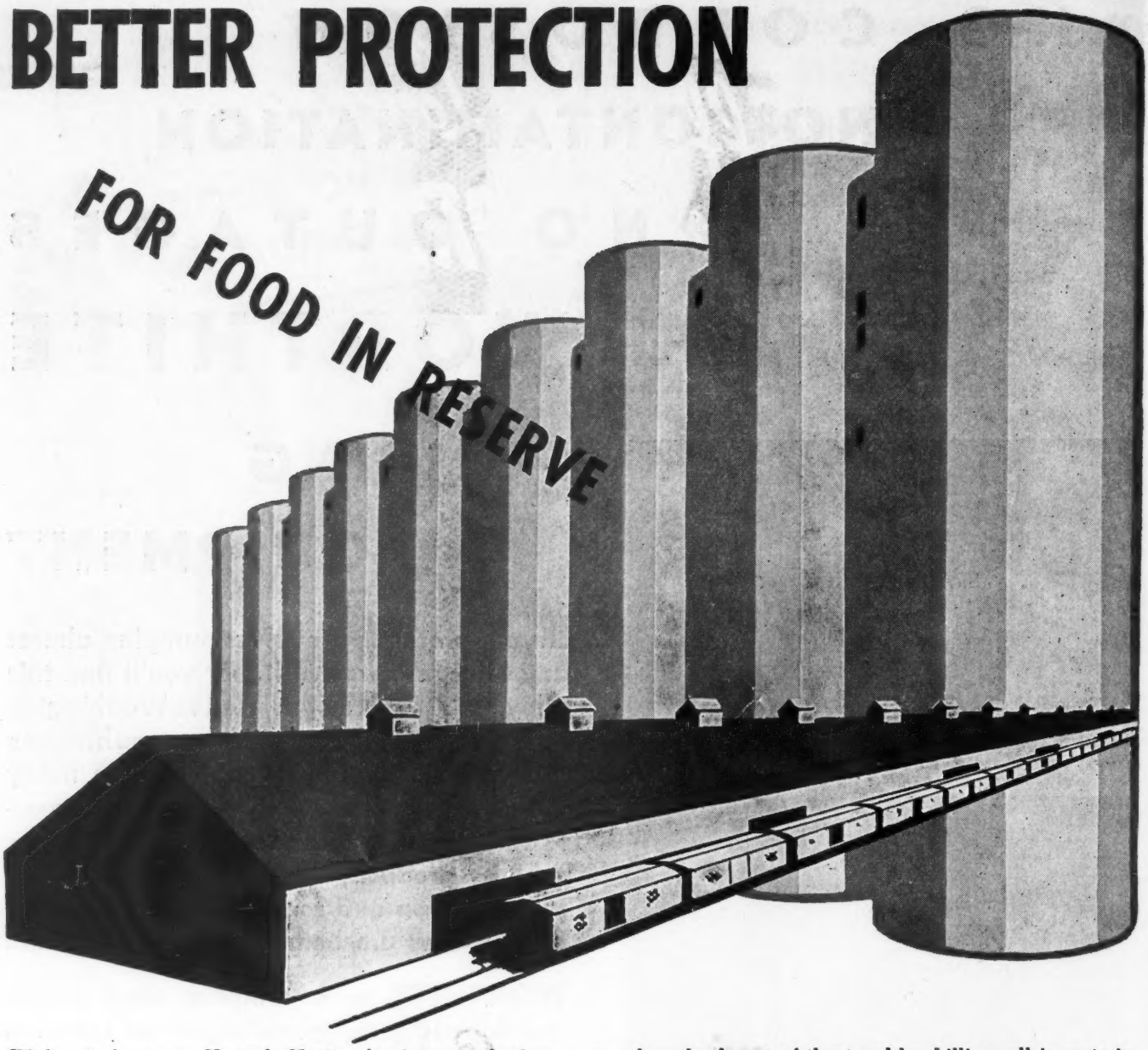
Both the Navy E and Army-Navy E Awards have been presented to Worthington for speed and excellence in production.

WORTHINGTON

WORTHINGTON PUMP & MACHINERY CORPORATION • GENERAL OFFICES: HARRISON, N. J.

BETTER PROTECTION

FOR FOOD IN RESERVE



With each new United Nations' victory placing record-smashing demands on our food supply, every single pound of available foodstuff must be protected from insect infestation. Only proper fumigation provides such protection—and today, proper fumigation means Methyl Bromide.

Developed by The Dow Chemical Company, this superior fumigant is helping warehousemen the country over to win the fight against invading insects. These men, experts in food storage, know Methyl Bromide is the *penetrating* fumigation material. Released in large or small warehouses, it quickly finds its way into the very center of every bin, bag or carton—it reaches the heart of the trouble—killing all insects in all stages of development. When the job is done, Methyl Bromide vents rapidly, permits stock and buildings to be returned quickly to normal routines.

Equally effective methods of fumigation in chamber, tarpaulin and boxcar operations take advantage of Methyl Bromide's outstanding properties. For technical data write to Dow or see the new special insert "Fumigation with Methyl Bromide" published for the U. S. Dept. of Agriculture, Circular No. 390.

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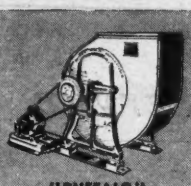
METHYL BROMIDE

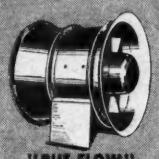
THE PENETRATING FUMIGANT

DOW

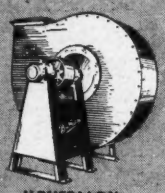
CHEMICALS INDISPENSABLE TO INDUSTRY AND VICTORY



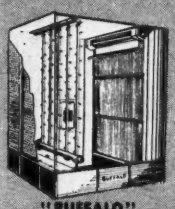
"BUFFALO"
Limit-Load Ventilating Fan



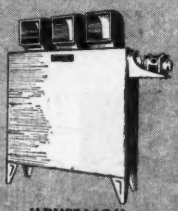
"BUF-FLOW"
Axial Flow Fan



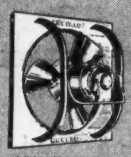
"BUFFALO"
MX Mill Exhauster



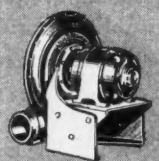
"BUFFALO"
Air Washer



"BUFFALO"
Highboy Unit Heater



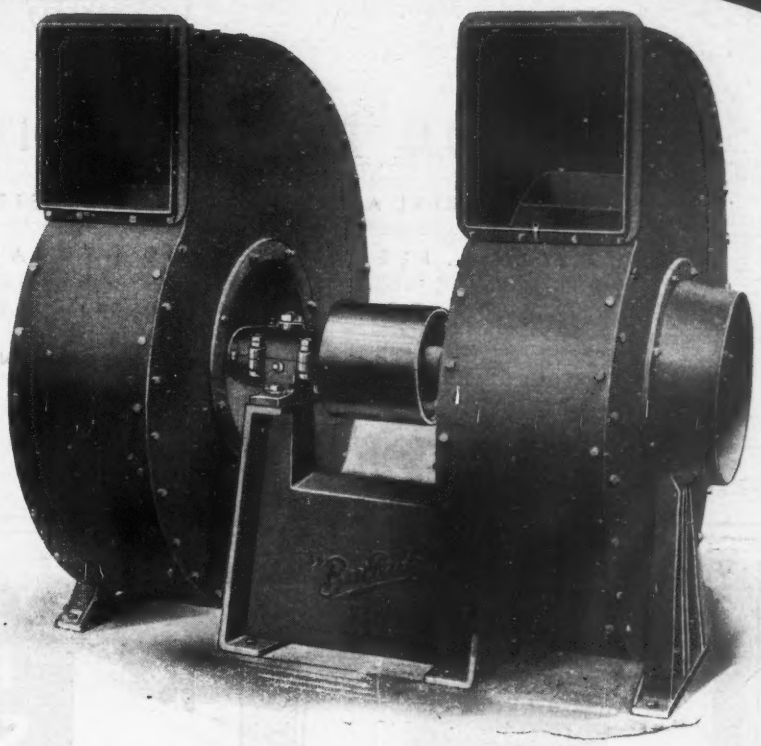
"BUFFALO"
Breezo Ventilating Fan



"BUFFALO"
Type E Blower

"BUFFALO"
Volume Fan

Efficient, Low Cost Control of AIR-BORNE REFUSE



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This heavy-duty Buffalo equipment is matched to the all-important job of continuous and thorough air renovation—eliminating dust, dirt, chaff, odors and waste heat—maintaining a sanitary atmosphere for food processing.

Buffalo Slow Speed High Efficiency Exhausters have larger housings, larger wheels, heavier shafts and bearing than ordinary exhaust fan designs—and although running slower and quieter—they handle air more efficiently than smaller, high speed types. Power savings up to 15% are common. Buffalo Exhausters are offered in a wide range of capacities to meet individual food plant requirements.

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Conserve
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"Buffalo" EXHAUSTERS

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INDUSTRIAL ARCHITECTURE • STRUCTURAL ENGINEERING

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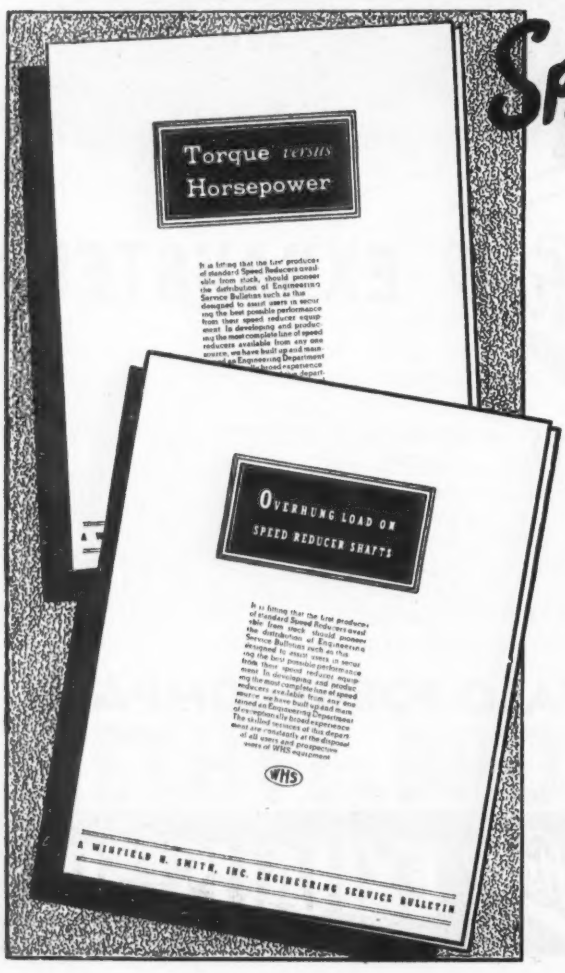
Torque versus Horsepower
Overhung Load on Speed Reducer Shafts
WHS
A WINFIELD H. SMITH, INC. ENGINEERING SERVICE BULLETIN

Speed Reducer

PROBLEMS SOLVED!

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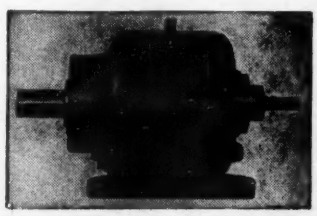
"Torque *versus* Horsepower" and "Overhung Load on Speed Reducer Shafts" are subjects arising frequently. Our Engineering Department has prepared a bulletin . . . non-technical, broadly helpful, on each subject. Send for one or both, no obligation. *Over 40 years of exceptionally wide and diversified experience contribute to the unusual value of these bulletins.*

No. 7 Differential Reducer



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WHS WINFIELD H. SMITH, Inc.

Springville, Erie County, New York

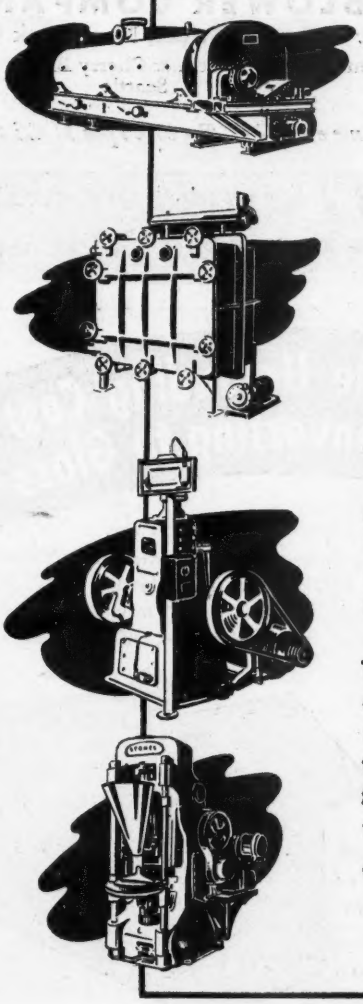
HIGH-VACUUM DEHYDRATING EQUIPMENT

- **Engineered by Stokes**
- **For Processing Fruit Juices, Meats, Soups, Vegetables, Concentrates, Specialties**

High vacuum may be the answer to some of your problems . . . in dehydrating heat-sensitive food products; citrus and other fruit juices, extracts, meats, fresh vegetables. For, under high vacuum, drying is completed rapidly, at low temperatures . . . quality, flavor and vitamin content are retained.

For nearly a half-century we have engineered and fabricated equipment for the processing industries . . . pioneered many new and improved methods including *drying from the frozen state under high vacuum (within the micron range) . . . specialized in applying high vacuum processes which have made possible the manufacture of better products on a more profitable basis.

You are invited to make full use of this engineering experience . . . also the facilities of our demonstration laboratory.



ROTARY DRYERS. We build rotary, also rotating, high vacuum drying equipment, widely applicable in drying foodstuffs which are sensitive to high temperatures. This equipment is economical to operate . . . exhaust steam, hot water or other inexpensive forms of heating may be used. With it conditions are always uniform and operating data, once determined, are constant thereafter regardless of climatic or atmospheric conditions. Many other equally important advantages.

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SHELF DRYERS. Wide range of sizes. Adapted to various forms of heating. Welded steel construction. Patented stay-bolt-less shelf construction offering perfectly smooth shelf top. Shelves are baffled to insure proper distribution of heating medium.

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AUXILIARIES. We manufacture pumps and gauges and other auxiliary equipment needed for efficient operation and exact control of processing under high vacuum . . . including the micron range.

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TABLETTING. Many food products are advantageously compressed into tablets or briquettes . . . certain of the Army rations, soups, concentrates, egg powders, etc. We built more than 30 models of automatic presses, to make available in tablet form an almost unlimited variety of products in sizes from the tiniest pellet to rectangular briquettes of 4" diameter.

Catalogs or more detailed information, on all the above equipment, are available.

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INCREASE YOUR PRESENT REFRIGERATION CAPACITY WITHOUT ADDING COMPRESSORS

PATENTED

● The NIAGARA "No-Frost" Method eliminates the progressive icing of refrigeration coils with the attendant loss of refrigeration. It enables you to refrigerate additional space without adding to compressor load —or to save power in present operation.

In addition, the Niagara DUO-PASS AERO CONDENSER increases refrigeration capacity by reducing head pressures. This has been proved by users' power costs reduced as much as 35% when the use of refrigeration capacity was not increased.

Save power and money, or increase refrigerated space by using these machines. For ample assurance of these benefits write for information on users' experience and for Niagara Bulletins 83, 91 and 95. Dept. FI-93

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General Sales Office: 6 E. 45th Street, New York City

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NIAGARA INDUSTRIAL COOLING • HEATING • DRYING HUMIDIFYING • AIR ENGINEERING EQUIPMENT

TERRISS STAINLESS STEELWARE

The above four pieces are representative of our complete line of TERRISS Stainless Steelware. IN SHEET STAINLESS STEEL we have open and closed tanks, with or without mixers, batch cans, funnels, measures, pails, scoops, evaporating pans, dippers, etc. IN CAST STAINLESS STEEL we have sanitary fittings, water filters, syrup filters, strainers, piping and tubing. We are also prepared to fabricate equipment to specifications.

All orders subject to preference ratings

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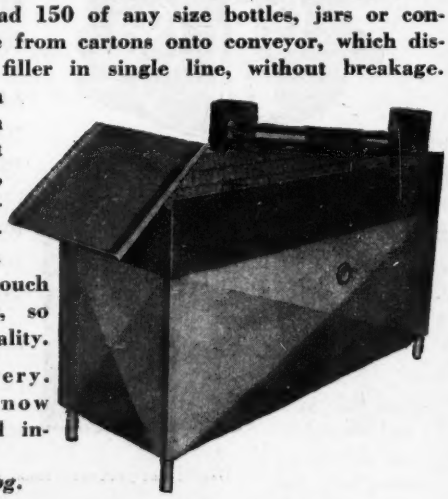
Cut Bottle Unloading Cost When Converting to Glass

With a Styl-O-Matic Infeed and Unscrambling Table, *one* operator can unload 150 of any size bottles, jars or containers per minute from cartons onto conveyor, which discharges them to filler in single line, without breakage. This is more than *two* operators can handle by hand. It reduces labor costs, increases production, saves breakage and floor space. Operator doesn't touch mouth of bottles, so sanitation is a reality.



Prompt delivery. High priorities now available for food industries.

Write for catalog.

ISLAND EQUIPMENT CORP.

101 Park Avenue New York, N. Y.

Styl-O-Matic Unscrambler

HOW TO GET MORE SERVICE FROM PUMP RODS AND SHAFTS...

PART 1—

Re-conditioning by machining and re-finishing

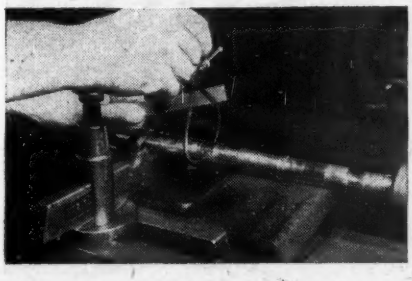
Worn pump rods, shafts and wearing sleeves are readily renewed by machining and refinishing, as described below. Usually, a light cut of less than 3/64 in. is sufficient to clean up the worn section.

However, one precaution must be observed: If too much metal must be removed the shaft may be unduly weakened. Therefore, if a shaft shows evidence of "whip" or a reciprocating pump rod tends to "bow" on pressure stroke, the pump manufacturer should be consulted. He will advise whether shaft needs building up before machining.

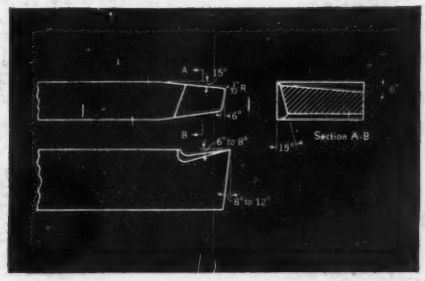
Methods for accomplishing the latter will be outlined in Part II of this subject.

Shafts and rods of Monel or "K" Monel can be reconditioned as described. Their high mechanical properties provide an extra margin of strength, rigidity, and toughness above the normal requirements of actual service.

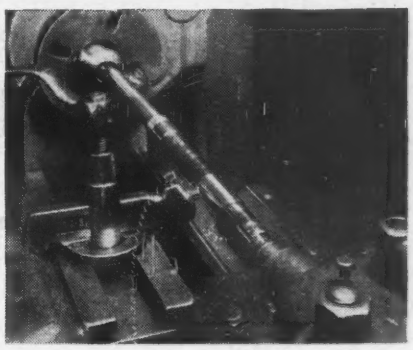
THE INTERNATIONAL NICKEL COMPANY, INC.
67 WALL STREET NEW YORK, N. Y.



1. Set up shaft or rod rigidly between centers of engine lathe. Support with a steady-rest, if necessary, to prevent chatter. Measure diameter of worn section with calipers or a point micrometer to determine amount of metal to be removed.



2. No special cutting tool needed — high speed tool preferable, but plain carbon steel satisfactory for this limited amount of machining. In machining Monel or "K" Monel tool should be ground as in sketch. Either a forged lathe tool, or a commercial tool bit (⅜-inch or ¼-inch) may be used.



3. Take rough and finishing cut leaving enough metal for filing and lapping to final size. No lubricant needed, machining should be done dry. When refinishing rods, length of taper on steam end can be reduced to suit refinishing dimension, but original length of taper on the liquid end should be retained to support bronze pistons. For machining Monel, a speed of 55-60 ft. per min. with .005 in. feed can be used; for "K" Monel, a speed of 35 ft. per min. with .005 in. feed.

4. File machined surface with light pressure, using single cut, smooth file. File should be kept clean, "balled filings" avoided by chalking. A shaft or rod should be filed in direction in which it operates. A shaft should be filed as it revolves in the lathe; a reciprocating rod should be draw-filed lengthwise, turning shaft by hand as filing progresses.

5. Lap filed surface with No. 0 then No. 00 emery cloth. Shaft or rod should be lapped in the direction it operates. The cloth may be held with *half-round* wooden block. Only use emery cloth as long as a clean metal surface results. Cloth should not burnish.

6. *Before re-installing*

(*a*) Carefully clean finished surface to remove any particles of emery.

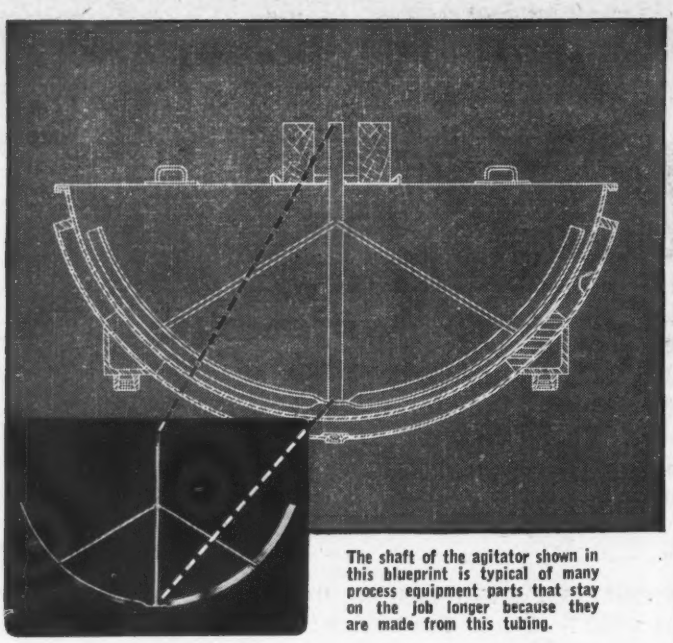
(*b*) Check need for new glands, bushings or followers, and larger size packing to fit smaller diameter of re-conditioned rod or shaft.

(*c*) Correct faulty condition or improper operation which may have caused original wear.

★ ★ ★ ★ ★ **INCO NICKEL ALLOYS** ★ ★ ★ ★ ★

MONEL • "K" MONEL • "S" MONEL • "R" MONEL • "KR" MONEL • INCONEL • "Z" NICKEL • NICKEL

Sheet . . . Strip . . . Rod . . . Tubing . . . Wire . . . Castings



The shaft of the agitator shown in this blueprint is typical of many process equipment parts that stay on the job longer because they are made from this tubing.

Check these 5 Advantages of this Welded Stainless Tubing!

Here are five of the reasons why more and more Carpenter Welded Stainless Tubing is used in many types of processing equipment:

1. **It provides positive protection against corrosion and heat.**
2. **It helps guard against product contamination.**
3. **Easy to clean, this tubing saves time between operations.**
4. **Its high strength-weight ratio permits the use of lighter gauges for lower costs, less weight.**
5. **Uniform walls and lighter gauges mean easier bending, flanging, welding, etc.**

For help in selecting the type of Welded Stainless Tubing best suited to your needs, get in touch with our Metallurgical Department. Ever since Carpenter pioneered the development of this type of tubing, we have provided production-engineering assistance to users and fabricators.

Fabricating Hints

in Carpenter's series of QUICK FACTS bulletins can help you get the most from Welded Stainless Tubing. A note on your company letterhead will start your series of QUICK FACTS bulletins on the way.

THE CARPENTER STEEL COMPANY
Welded Alloy Tube Division . . . Kenilworth, N. J.

Carpenter
WELDED
STAINLESS TUBING

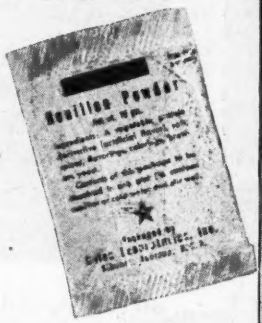
WAR PACKAGING

S&S Machines help fill War Contracts faster!

15 – 30 – 60 – 120 PER MINUTE!

S & S collaboration with leading packers has solved some of the toughest packaging problems of this war . . . has been a short-cut to speedy, economical packaging in packages that really protect.

DRIED EGGS
are one of many foods for Lend-Lease packaged on S & S packaging lines converted to this job with S & S assistance.



MILLIONS
of Army Ration "K" units are packaged on the S & S Transwrap . . . formed, filled and heat sealed in one continuous operation. A low cost, fully protective package that has many wartime uses.

FEEDING
our armies and the people of the United Nations and conquered countries require vast amounts of dehydrated foods. A good percentage of this is S & S wrapped.

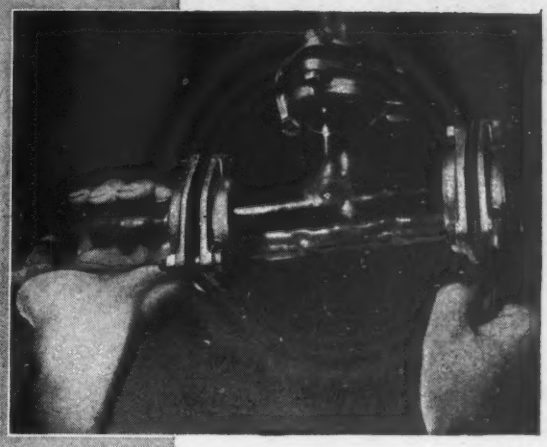
FILLING, PACKAGING, WRAPPING MACHINES for Munitions, Lend-Lease, Foods, Drugs and essential Civilian Use . . . . .

Remember, if you have a problem in wartime packaging—*call in S & S!* Ask us about converting your present machines to wartime needs . . . Or, if your product has a high rating as war-essential, ask about the new S & S machine for its rapid, low-cost packaging. Use this service freely; there's no obligation!

STOKES & SMITH Co
PACKAGING MACHINERY — PAPER BOX MACHINERY
Dept. M, Frankford, Philadelphia, U.S.A.

Users of Pyrex Piping say

"BREAKAGE IS NOT A PROBLEM"



Corning can give you scientific data about the toughness of PYREX brand Glass Piping, its mechanical strength, degree of hardness, and so on. But the only effective answer to the breakage bugaboo comes from actual users—and in a recent survey not one user was found who would admit that breakage is a problem.

Here are three typical answers to the question: "Are you troubled by breakage?"

ABSOLUTELY NO BREAKAGE PROBLEM

"We've used PYREX brand Glass Piping for fifteen years—use thousands of feet of the 2-inch size to carry heavy syrups. Though only one small section which runs alongside a loading platform is protected by a metal guard, we have absolutely no trouble with breakage."

"We have about 600 feet of 1½" PYREX Piping in our bottling department. We installed it three years ago and have had no breakage. If a length were broken occasionally, it would mean nothing compared to the value to us of the visibility and purity features."

CAREFUL HANDLING IS INSTINCTIVE

"We started using PYREX Piping in 1937 and never think about the chance of its being broken. Our men know glass when they see it and are governed accordingly. Breakage is much more likely to be a problem with a piping material such as ————————."

AVAILABLE NOW

The truth is that even in the most rough and ready plants, workmen recognize glass and almost automatically handle it with the necessary care. Corrosion-resistant to all acids (except HF) PYREX brand Glass Piping does not deteriorate and may be considered a permanent investment. Its visibility, ease of cleaning, and perfectly smooth surface are factors that merit your serious consideration. PYREX Piping has a full line of accessories including all usual elbows and joints. What's more, it is available today.

"PYREX" is a registered trade-mark and indicates manufacture by Corning Glass Works, Corning, N.Y.

CORNING
Glass Works
Corning, New York

Pyrex Industrial Glass
BRAND

Conferences Alone Can't Feed A Nation at War – Efficient Equipment Is A Necessity!

The responsibilities of the food industry have been increasing rapidly since the advent of war. Prompt and economical production has become an absolute necessity.

That is why the food industry looks to KOVEN for reliable equipment, designed and fabricated by expert engineers to meet the individualized demands of each manufacturer.

Economical and up-to-the-minute, KOVENIZED equipment epitomizes the efficiency that only experienced workmanship can produce.

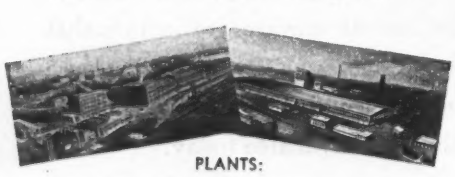
If you have a production problem, call or write KOVEN today. Our skillful engineers will be pleased to consult with you about your own particular needs.

A consultation obligates you in no way

Among the many KOVEN products:

Stainless Steel
Aluminum Sheet Fabrication
Boxes, Tote, Waste Cans
Chemical Apparatus
Coils and Pipe Bands
Copper Sheet Fabrication
Galvanizing Work
Mixers, All Kinds
Monel Metal Fabricator
Pails, Special Heavy
Pans, All Types, All Metals
Sinks, Scullery and Factory
Tables, Galvanized or Monel
Tanks, All Types, All Metals
Kettles, All Types, All Metals

WATERFILM Industrial Heating Boilers



PLANTS:
Jersey City, N. J. Dover, N. J.

L. O. KOVEN & BRO. INC.

154 Ogden Ave.
Jersey City, N. J.

FULLERGRIPT BRUSHES

MEET THE NEEDS OF DESIGNERS, BUILDERS AND USERS OF MACHINERY IN THE FOOD INDUSTRY

FULLERGRIPT Brushes for
BAKERIES
DAIRIES
FLOUR MILLS
MEAT PACKING
FRUIT GRADING
CANDY—ETC.

TO manufacturers and processors of Food: Wherever you use Brushes, consider Fullergript's enduring construction. Conveying equipment, wrapping and packaging, bottling and labeling machinery operate more efficiently with these sturdy, long wearing Brushes.

Also try our standard line of Floor Brushes, Dusters and the famous FULLER FIBER Broom.

The FULLER BRUSH *Company*
Industrial Division, Dept. 8C
3592 MAIN STREET · HARTFORD, CONN.

Frozen Foods Directory

This Directory is the most comprehensive "quick" picture of activities in the Frozen Foods Industry yet published. In addition to listing the names of the companies, the following data is given for the majority of them:

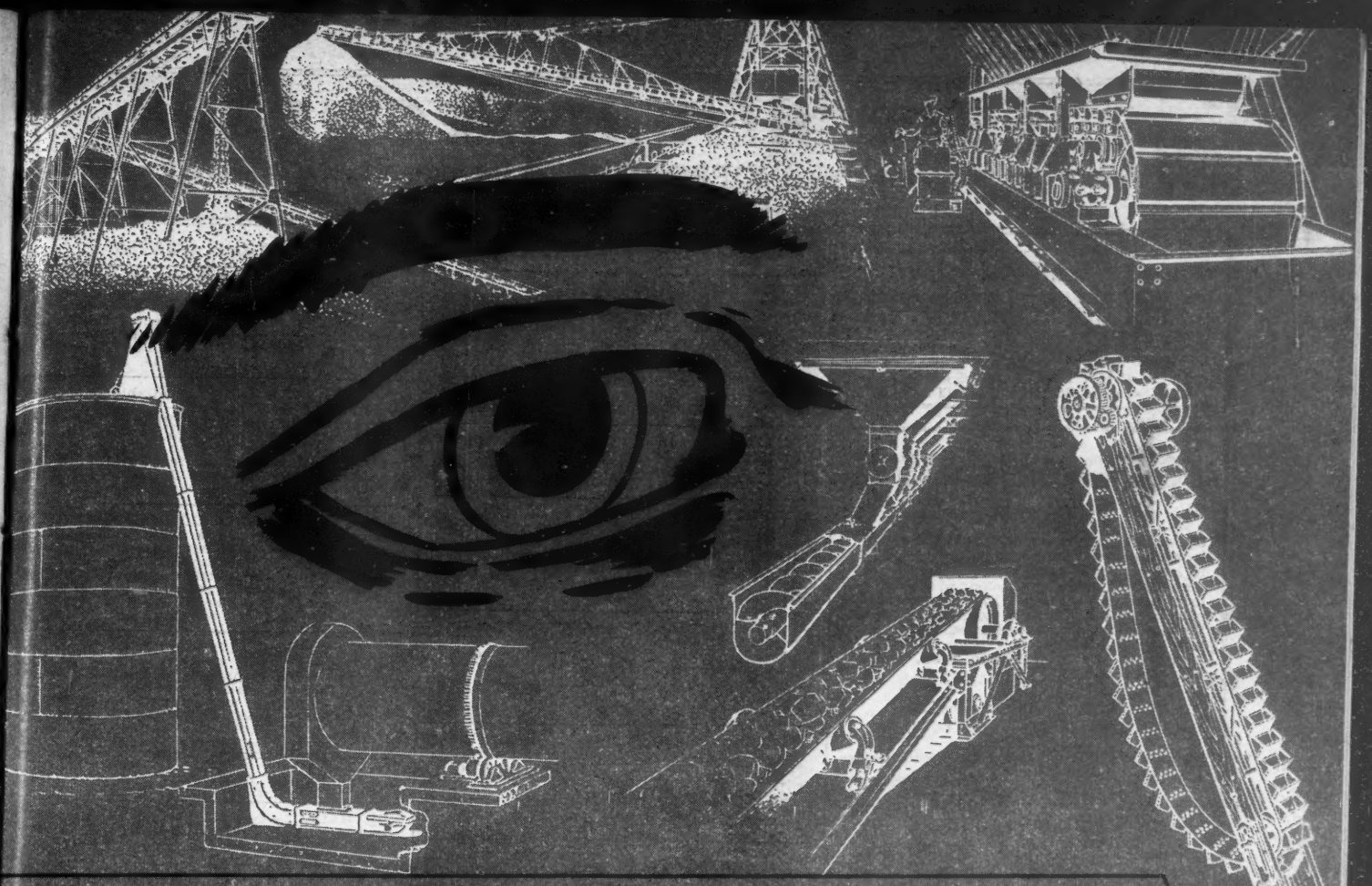
1. ***WHERE* the freezing is being done!**
2. ***HOW* it is being done — what system is used!**
3. ***WHAT* products are being frozen!**
4. ***BRAND NAMES* of frozen foods!**
5. ***THE TYPE* and size of containers and packaging materials being used!**
6. ***The QUANTITIES* frozen in the past!**
7. ***THE SCHEDULED PRODUCTION* for the future!**

If you want to know what's going on in the Frozen Foods Industry—see this "Frozen Foods Directory." Now available at 35¢ per copy.

Note—10 or more copies to one address—25¢ each

FOOD INDUSTRIES

Department FD
330 West 42nd Street, New York, N. Y.



Look at Your Conveyor Problems

Through *Experienced Eyes*

In your industry, yours are the experienced eyes. We, at Stephens-Adamson, have the trained and experienced eyes in the material handling field.

Here are competent engineers (who have spent entire careers with this company)—ready always to help you gain an objective view of your conveying problems. For them, the highest goal is the installation of the right conveying system for any specific job . . . Here are men thoroughly qualified to go over your present or anticipated operations with one constructive aim — to discover faster, safer, low cost ways of moving materials. This is most significant when you start thinking—as we already are—about post-war conveying problems connected with new processes, new materials, new finished goods you may have in mind. Call in an S-A engineer to give you sturdy pegs on which to hang your thoughts.

STEPHENS-ADAMSON MFG. CO., 6 Ridgeway Ave., Aurora, Ill.

STEPHEN S-A DAMSON

MFG. CO.

Designers and Manufacturers of All Types of

BULK MATERIAL HANDLING EQUIPMENT

SEARCHLIGHT SECTION

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

For rates see page 187

WANTED CHEMICAL ENGINEERS

Vegetable oil processing plant in southwest desires to expand its technical and supervisory personnel. Men with chemical engineering education and experience needed for process development and production. Immediate opportunity for administrative and technical positions.

P-183, Food Industries
330 West 42nd St., New York, 18, N. Y.

FOOD CHEMIST

WANTED

Opportunity for an experienced food chemist and quality control man. Our company is looking for a man with the ability to manage and control production of specialty food products. At least 10 years experience and a knowledge of formulae desired. We are offering an excellent salary to the man who qualifies. Our main plant is located in the Philadelphia area. Write full particulars to

P-189, Food Industries
330 W. 42nd St., New York 18, N. Y.

MANAGER WANTED

for Apple Juice and Cider Plant.

Experienced in production and plant supervision, also interested in making minor capital investment.

P-182, Food Industries
68 Post Street, San Francisco 4, Calif.

INVENTIONS WANTED

★ An old established metal fabricating company with complete production and selling organization wants PATENTS or INVENTIONS which utilize its heavy manufacturing facilities.

★ *Food Processing Executives* —if you need a mechanical idea of one of your employes developed or manufactured, we can help you.

★ *Food Processing Employes*— if you have ideas for labor saving or product improvement in your work, we will develop and produce on royalty basis, or purchase outright.

If interested, send us patent numbers or a general description leading to further negotiation.

BOX 186, FOOD INDUSTRIES
520 N. Michigan Ave., Chicago 11, Ill.

POSITIONS VACANT

WANTED: EXPERIENCED MAN in essential vegetable cannery located in Wisconsin. Permanent job, plenty of opportunities for advancement and expression of personal ideas. Knowledge of Chemistry, bacteriology and canning procedure essential. Man to have charge of Research Laboratory. Write giving experience, age, salary expected and draft status. All information confidential. P-162, Food Industries, 520 N. Michigan Ave., Chicago 11, Ill.

WANTED Foreman dry fertilizer mixing plant Atlantic Coast. Write experience and salary desired. P-169, Food Industries, 330 W. 42nd St., New York 18, N. Y.

SUPERINTENDENT: Well established food plant affords excellent opportunities for aggressive man with knowledge of fruit packing. Permanent position, excellent salary. State age, draft status, experience in detail first letter. P-187, Food Industries, 330 W.42nd St., New York 18, N. Y.

MAINTENANCE FOREMAN: With detailed experience on fruit canning equipment. Eastern food manufacturer offers permanent position with wonderful salary opportunities. In first letter give age, list of previous employers, draft status. P-188, Food Industries, 330 W. 42nd St., New York 18, N. Y.

WANTED: Man with engineering ability, capable of supervising the planning and setting up of processing lines and their maintenance. (5 men & workshop). Permanent position with new company in quick freezing of vegetables. Give complete details. P-190, Food Industries, 330 W. 42nd St., New York 18, N. Y.

WANTED: Man familiar with the salted peanut business, who understands buying, processing, packaging, etc. P-191, Food Industries, 520 N. Michigan Ave., Chicago 11, Ill.

MAN with knowledge of food industries and processing including problems of the meat packing, canning and dairy industries. Must combine sales and technical experience in extending service to national food accounts, also to work with present well-established sales and service organization on cleaning and maintenance operations in the Food Industry. Must be willing to travel. Give brief history regarding experience, age, salary, marital and draft status. Replies held confidential. P-196, Food Industries, 330 W. 42nd St., New York 18, N. Y.

CHEMIST WANTED

Research and control in Food Processing Industry. Draft Exempt

Write
P185 Food Industries
330 West 42nd St., New York, 18, N. Y.

FOODS

With a view to post-war development large English firm of Food manufacturers with surplus capital and manufacturing facilities available is desirous of entering into negotiations with American firm. Would be prepared to purchase outright suitable Trade Mark or Patent, or enter into manufacturing arrangements on royalty basis. Have connections throughout Great Britain with Grocers, Bakers and allied trades. Replies treated strictly confidential.

Box 200 C/o T. B. Browne, Ltd.
551 Fifth Avenue New York City

POSITIONS WANTED

Young M.I.T. FOOD TECHNOLOGIST with experience in control, research, developments and production desires position as assistant to executive in production. Expects and willing to earn good salary. Only permanent non-wartime offer considered. PW-192, Food Industries, 330 W. 42nd St., New York 18, N. Y.

FOOD TECHNOLOGIST: Available soon. Now completing work at M.I.T. leading to bachelor's degree in Industrial Biology and Food Technology. Protestant, age 24, draft classification 4-F. Desire position with progressive food processing plant or fermentation industry. Write PW-194, Food Industries, 330 W. 42nd St., New York 18, N. Y.

PLANT OR PRODUCTION MANAGER, 20 years experience in a wide field of food products as manager, superintendent and all other phases of industry. College education, married, and prefer outside of New York City. Can furnish best of references. Availability statement can be secured. PW-195, Food Industries, 330 W. 42nd St., New York 18, N. Y.

FOOD LABORATORY DIRECTOR wants position. Thoroughly experienced new product and process development, packaging, Government Contracts. Salary to meet government ruling. Employed seventeen years in Food Field. PW-198, Food Industries, 330 W. 42nd St., New York 18, N. Y.

FOR SALE

FOR SALE 2—4x4 Slo Speed flat belt drive arctic ammonia compressors with idlers and double pipe condensers. $200 for both plus crating. Send for list of other equipment. Black & White Corp., 574 West 130th St., N. Y., 27, N. Y.

WANTED

GLASS JARS AND TUMBLERS wanted for preserves and jelly,—any size. State quantity, price, and other details. W-193, Food Industries, 330 W. 42nd St., New York 18, N. Y.

UNIT HEATER—to heat room 1500 sq. ft. floor space. For connection to low pressure steam line. Must be in A-1 condition. Write full specifications, motor size, and price, to Allen Products Co., Allentown, Pa.

FACTORY MANAGER

One of New York's largest, most modern bakeries offers unusual opportunity in essential industry. (Baking experience not required.)

The man we want will supervise all plant activities and must know how to handle men. Proven record of accomplishment in plant management, maintenance and engineering is essential.

Give full details of experience, personal background, salary and draft status in first letter. All replies confidential.

BO-197, Food Industries
330 West 42nd St., New York 18, N. Y.

Don't forget the Box Number

WHEN answering the classified advertisements in this magazine, don't forget to put the box number on your envelope. It's our only means of identifying the advertisement you are answering.

Sold American!

We Have Sold American Plants Various Types of Equipment, Redesigned and Rebuilt to Meet the Urgent War Production Needs of the Food Industries.

We are Still Meeting Demands with Items Like These

F M C

1—Sweetland No. 10 Duriron Fitted Filter.

1—Standard Knapp Shipping Case Gluer and Sealer.

1—Premier S. S. Colloid Mill 5½".

2—Mikro No. 4 Pulverizers, 24". Complete with motors.

2—Louisville Tubular Dryers, 6'x35'.

2—Devine Rotary Dryers 5'x30', 3'x25'.

1—National Automatic 2 station, auger type filler; speed 60 per minute.

2—World automatic labelers.

15—Burt, Knapp, Ermold, World semi-automatic labelers.

1—Langsenkamp No. 167, Pulper; S.S. screen.

Important Values

IN FOOD EQUIPMENT

Send for Bulletin MFB 8-43

FMC FIRST MACHINERY CORP.

EAST RIVER DRIVE EAST 9th ST., N. Y.

FOR SALE

Triangle Model "U" Bag Filler.
Hayssen Cellophane Box Wrapper.
Schutz O'Neill Dustless Sugar Pulverizer No. 3, No. 0 and 16" Limited.
24" Pebble Mill, belt drive.
1 ton York, 1 ton Lipman 3 ton Frick, 5 ton Jurick and 7½ ton Lipman Self-contained Refrigeration Units.
Steam Jacketed Copper Kettles, 15 gallon to 350 gallon capacity.
Dean Glucose Pump Steam Driven.
Tabor 3" Glucose Pump, motor driven.
Read 80 qt., Hobart 80 qt., Century 30 qt., and Read 12 qt. Vertical Mixers.

SAVAGE BROS. CO.

2638-46 Gladys Avenue Chicago

FOR SALE

5—Copper Spray **Drying Towers**, 8'6" dia. x 32' high
1—**Burt** Multiple Series A Can Labeler
90—Wood Storage and Fermenting **tanks**, 130-8600 gal.
30—Steel welded and sectional storage **tanks**, 3,000-18,000 gal. with legs and manholes.
6—**Kiefer, Goldman, and U. S. Rotary Bottle Rinsers**
11—**J. H. Day Horizontal mixers and sifters**
7—**O. & J. Rotary, World & Ermold** semi-automatic **labelers.**
1—Creamery Pkg. Mfg. Stainless Steel 100 gal. **Pasteurizer**, rectangular, 46 x 20 x 32, with Stainless Steel Agitator.
3—**Richardson & Fairbanks** automatic grain **scales**
14—**Columns**, Stainless Steel, copper, cast iron, 7" to 72"
900'—Double **Pipe Coolers**, copper and steel, all sizes.
5—New 60 gal. Stainless Steel **tanks** with covers
1—**Horiz. Rotary vacuum filler**, 14 spout, takes up to quarts.
20—Bronze, Iron, Stainless Steel **Pumps**

Also Liquidating Mayburg Chemical Co.:
Pot Stills, Columns, Ether Extractor, Condensers, Retort Condensers, Copper Vapor and Process Piping.

Write for latest stock list.

PERRY EQUIPMENT & SUPPLY CO.

1515 W. Thompson Street Phila., Pa.

WE BUY SINGLE ITEMS TO COMPLETE PLANTS

FOR CASH!

SPECIAL OFFERINGS!

Glass Lined Jacketed Closed Kettles, 600 & 1150 gal.
BERLIN CHAPMAN 6 Pocket Liquid Filler, Stainless Hopper.
KIEFER Visco Filler, for gals. & #10 tins.
OLIVER Continuous Rotary Filters, 4' x 5'.
SPERRY 24" Bronze Plate & Frame Press.
SHRIVER 18" Plate & Frame Aluminum Filter Press, closed delivery.
OLIVER UNITED 18" Wood Plate & Frame Filter Press, open delivery.
KETTLES, Copper Jacketed, 50 gals., tinned.
KETTLE, Jacketed, 100 gal. all Nickel.
A & F BROWN 24" Cogswell Attrition Mill, pulley drive.
QUAKER CITY #B13 Grinder, pulley drive.
Mixers & Sifters, 100 to 600 lb.

MACHINERY & EQUIPMENT CORPORATION (of N. Y.)

59 E. 4th St. New York 3, N. Y.

Davidson Wet Vacuum Pump 3½ x 4 x 4.
Several used Copper Steam Jacketed Kettles.
3 HP Elec. Motor D.C. 575 rpm perfect.
One 10 HP Kane gas fired steam boiler almost new.

THOMAS BURKHARD, Inc.

494-496 Flushing Ave., Brooklyn, N. Y.

SPECIALS IN STOCK

1—Buffalo 5'x6' Atmospheric Drum Dryer
2—Rotary Vacuum Dryers, 2½'x10', 3'x8'
2—Carrier 12 truck Atmospher'c Dryers
1—Double Drum Atmospheric Dryer, 4'x9'
2—Copper Vacuum Pans, 2'6", 7' dias.
12—Steel Jacketed Kettles, 50 to 2000 gal.
25—Copper Jacketed Kettles, 20 to 250 gals.
1—Copper Still, 6' dia., with condenser
1—Pfaudler 42" dia. x 9' high Glass Lined Vacuum Pan, with copper coils
4—40" Tolhurst Suspended Type Centrifugals, motor driven
7—Tolhurst 32", 40", 48", 60" Centrifugals, belt driven
3—Sharples No. 6 Centrifuges
3—De Laval No. 200 to 600 Centrifuges
10—Day, Robinson Powder Mixers, 50 to 2600 lb.
12—Ross, Day, W. & P. Read Dough Mixers, 8 to 300 gal., jacketed, and plain, single and double arm
1—36" x 36" Cast Iron Filter Press
2—Sweetland Filters, No. 5 and 7
3—Oliver Rotary Filters, 5' x 6', 5' x 8'
2—Raymond Roller Mills, 3 and 5 roll
5—Raymond Impact Mills, No. 0000 to No. 3
8—Hammer Mills, Williams, Gruendler, Jeffrey
5—Mead Mills, Nos. 1, 2, 3
18—Pebble Mills, Lab. to 300 gal.
15—Bottle Labelers, World, Ermold
3—Paste Fillers, Stokes, Colton
2—Can Fillers, Buffalo, ½ to 5 gals.
20—Wood Tanks, 500 to 10,000 gal.
12—Vacuum Pumps, belt and motor driven
25—Rotary and Centrifugal Pumps, 1" to 5", bronze, iron, belt and motor driven
12—Vibrating Screens, Rotex, Tyler
8—Bucket Elevators, up to 50' centers
200' Screw Conveyor, 6" to 12"
200' Roller Conveyor, 12" to 24"

BRILL Equipment Co.

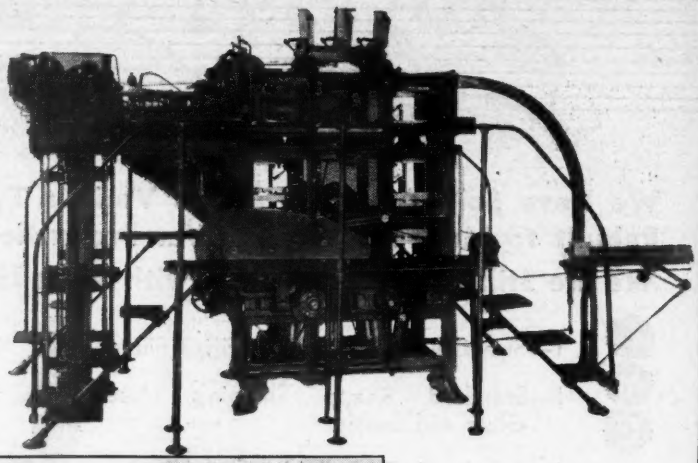
183 VARICK STREET NEW YORK

Zone 14

FOR SALE!

Priority Easily Obtained

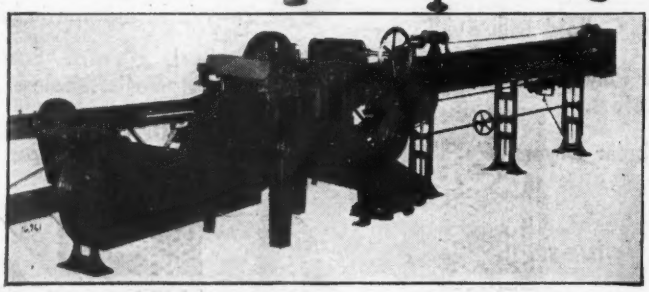
These Complete High-Speed PACKAGING MACHINES!



- **Automatic carton combination sealer, side seam gluer and bottom maker and top sealer, complete with dryer.**
- **High speed. Makes 90 packages a minute.**
- **Built to handle any one size within the following range:**

Minimum: Length 3"—Width 1¾"—Height 1½".

Maximum: Length 6"—Width 4"—Height 2".



Here is an opportunity that occurs but rarely these days!

Due to a change in our factory planning, we are able to do without these modern high-speed packaging machines. They were built by the Battle Creek Bread Wrapping Machine Company and are still in their original crates. They are new, will give excellent service, and the price is right. Delivery can be immediate. Priority easily obtained.

Solve Your Wartime Packaging Problem by Seizing This Opportunity!

For full details, write to:

B. T. BABBITT, INC.
12-40 Broadway
Albany, N. Y.

1—Cast Iron Jacketed Glass-Lined Kettle, Agitated, 250-gals. capacity

1—Lead-Lined Autoclave, 2-gals. capacity.
3—Jacketed & Unjacketed Autoclaves, 2-qts., 2½-qts.
2—Steel Autoclaves, 1000-gals., Agitated.
2—W & P Vacuum "Uni-Dor" Mixers, 75-gals.
1—W & P Bronze Mixer, 30-gals. capacity.
3—Ross Kneading & Mixing Machines, 100-gals.
1—Hottman Mixer, #4.
6—Sharples Super Pressurite Centrifuges.
2—King & Gerber 60" Rubber-Lined Extractors.
1—Copper Jacketed Kettle, 3750-gals.
6—Dopp Kettles, 80-gals. to 300-gals.
1—Steam Jacketed Stay-Bolted Tank, 8000-gals.
1—Louisville Rotary Steam Tube Dryer, 6'x50'.
1—Allbright-Nell Drum Dryer, 4'x9'.
1—Rotary Crystal Dryer, 5'x26'.
2—Ruggles-Coles Rotary Direct Heat Dryers, 54"x20'.
3—Steel Pressure Degreasing Ovens, 7'x7½'x15'; 9'x8'x15'.
1—Single-Effect Evaporator, 54"x16', 2" copper tubes.
1—Copper Jacketed Still, 50-gals., Condenser & Column.
1—Meakim Continuous Expelling Machine.
1—Karl Kiefer Six Spout Bottle Filler.
2—INC Wooden Continuous Filters, 4'x10'4"; 8'8"x6'.
6—Schultz-O'Neill Pulverizers, 16"; 20".
2—Premier Colloid Mills, 5", Liquid-Type.
1—Hurrell Homogenizer, Type 14, 30 HP Motor.

R. GELB & SONS, Inc.
Est. 1886
Union, N. J. **UNionville 2-4900**
(Send for "Gelb News Record").

$50,000 Liquidation!
FOOD PROCESSING AND CANNING EQUIPMENT

Ask for complete list of over 300 items.

HORNE-ASH MACHINERY CO., INC.
1188 Harrison St., San Francisco
Tel.: UNderhill 5571

D. B. LEWIS CO.
3402 Avalon Blvd. Los Angeles
Tel.: ADams 3303

FOR SALE

PACKAGING MACHINE

Semi-automatic J. L. Ferguson packaging machine equipped with top and bottom sealer, volumetric weigher. Motor operates on 220 volt current. Fitted with blocks to handle carton 2½x1⅜x3⅜ but can handle variety of sizes with new blocks. Capacity 40 to 50 cartons per minute. Dimensions: Length overall, 10½ ft.; height, 6 ft. 5 in.; width 20 in. Cost, original over $4000. Rebuilt by manufacturer within past few months. Like new. Price $3400 F.O.B. Brooklyn. For further information write

ECONOMICS LABORATORY, INC.
St. Paul, Minnesota

WANTED

WANTED

2—Tablet Machines; 3—Filters.
2—Dry Powder Mixers, with or without Sifters.
2—Rotex Screens; 1—Packaging Machine; 1—Glass Lined Kettle; Stainless Steel, Monel, Copper or Aluminum Jacketed Kettle and Vacuum Pan.

W-132, Food Industries, 330 W. 42nd St., N. Y. C.

WANTED

Large AC Case Emulsifier, complete with motor. State condition and price.

HELWIG & LEITCH, INC.
101 North Haven St. Baltimore 24, Maryland

WANTED
Vegetable Dicer

FOR SALE
Colborne Cherry Pitter with motor
Thomas Mills Nut Breaking Machine #2 with motor. Practically new.

BAKERS' FOOD PRODUCTS CO.
819 East 5th St., New York 9, N. Y.

WANTED
MIXER

Good used steam jacketed horizontal mixer, 200 to 300 gallons, trough and ends, and blades, machined to do clean scraping.

W-184, Food Industries
520 North Michigan Ave., Chicago 11, Ill.

WANTED
FOOD PRODUCTS

We will buy available dehydrated vegetables, meat and milk products and concentrated fruit juices. Edible government rejects wanted. State quantity and price.

International Foodcraft Corp.
63 Whipple St., Brooklyn 6, N. Y.

NO LET DOWN ON PRODUCTION!

Speed Up With

"CONSOLIDATED" REBUILT EQUIPMENT

- 1—Pneumatic Scale Packaging Unit.
- 1—Pneumatic Scale Automatic Wax Liner.
- 1—J. H. Day #2 Brighton Mixer, 80 gal. cap.
- 6—8 to 40 gal. Pony Mixers.
- 15—Dry Powder Mixers, from 50 to 4000 lbs.
- 3—Edbauer, Scott, U. S. Auto. Weighers and Fillers.
- 2—80-qt. Century 4-speed Mixers, m.d.
- 1—28"x60" double drum Atmospheric Dryer.
- 2—Buffalo 24" Vanilla Bean Chopper.
- 4—World, 1-Ermold semi-auto. Labeling Machines.
- 2—Karl Kiefer Visco Filling Machines.
- 1—Johnson mod. JA Cellophane Wrapper.
- 6—Filter Presses P & F; Recessed; to 42" Square.
- 1—World Rotary Automatic Labeling Machine.
- 1—Stokes 500 gal. Copper Jacketed agitated vacuum Pan.
- 2—Mechanical 4x9' Lard Rolls, m.d.
- 17—Stainless Steel, Copper; Glass Lined; Kettles and Vacuum Pans, up to 550 gal. cap.
- 2—Schultz-O'Neil Pulverizers.
- 3—K.K. & U.S. Rotary bottle Rinsers, m.d.
- 1—5x35' Louisville Steam Tube Dryer.
- 1—Elgin 12-spout Rotary Piston Filler, S.S.
- 12—Copper Tanks to 7000 gal.
- 1—Johnson T & B Sealer Unit.
- 4—2"x2" Bronze Rotary Pumps, m.d.

● *Send for "Consolidated News" listing complete stock.*

We buy and sell from a Single Item to a Complete Plant

CONSOLIDATED PRODUCTS CO., Inc.

Office: 13-17 PARK ROW, N. Y. Shops: 335 DOREMUS AVE., NEWARK

Buy With Confidence — "Consolidated"

UNION Rebuilt Machinery Established 1912

Rebuilt Guaranteed Machinery

SPECIAL
Just Received

1—Pneumatic Scale 20 spout vacuum type filling machines.

1—Johnson Automatic lining and setting up machine, top sealer and interconnecting conveyor

---

SEARCHLIGHT SECTION

(Classified Advertising)

Employment and Business "OPPORTUNITIES" Equipment, Used or Resale

UNDISPLAYED RATE

10 CENTS A WORD. MINIMUM CHARGE $2.00.

Positions Wanted (full or part time, salaried employment only), ½ above rates, payable in advance.

Box Numbers—Care of publication New York, Chicago or San Francisco offices count as 10 words. Replies forwarded without charge.

Discount of 10% if full payment is made in advance for 4 consecutive insertions.

DISPLAYED RATE

Individual Spaces with border rules for prominent display.

The advertising rate $6.00 per inch. Contract rates on request.

An advertising inch is measured ⅞" vertically on one column, 3 columns—30 inches—to a page.

Copy for new advertisements received until the 21st of the month for the issue out the following month subject to space limitations.

SELECTED BUYS

from the West Coast

7—Anderson #2 Dicers
Sterling Model 1-D Dicer
Horiz Retort, qk opening 4 x 18
2—World Labelers, Semi-Auto.
Oslund Semi-Auto for 3 Labels
Sprague Liquid Filler, #10 Cans
Eppenbach Colloid Mill 3 HP Motor
Batch Peelers, 45, 60 & 75 Lbs.
Hoepner Automatic Scale, 1 Spout
12—Tilt Kettles, 10 Gal Cpr Jktd
Aluminum Upright Kettle, 25 Gals
Karl Kiefer Rinser, 72 Spout Rotary
A-B Cooker 1360 Cans, #1-T & #2
A-B Cooker & Cooler for #2½ Cans
U. S. Piston Type Filler for 8 Oz
Century Vert Mixer, 80 Qts 4 Spds

Specialists in all types of food machinery
Let us know Your specific needs

★★

We Buy and Sell . . . .
Single Items to Complete Plant

For Dependability with Economy
MACHINERY AND EQUIPMENT CO.
251 STEVART STREET SAN FRANCISCO CALIF.

In Stock . . . Ready For Immediate Delivery

ALL OFFERINGS SUBJECT PRIOR SALE!

Wire Collect For Prices & Details!

Pneumatic Scale Co. Top Sealer and Wax Liner.

48" Copper Vacuum Pan, jacketed, complete with condenser, vacuum pump, etc., also 20 to 300 gal. sizes.

World Semi-Automatic Bottle and Jar Labeler.

Ermold Bottle Labeling Machines, motor driven.

Werner & Pfleiderer, 2,500 gal., double arm jacketed Storage and Mixing Tanks.

U. S. Bottlers 10 spout Model C-10 Filling Machine, 4 to 16 oz. cap.

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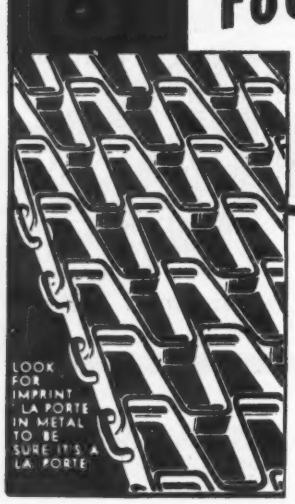

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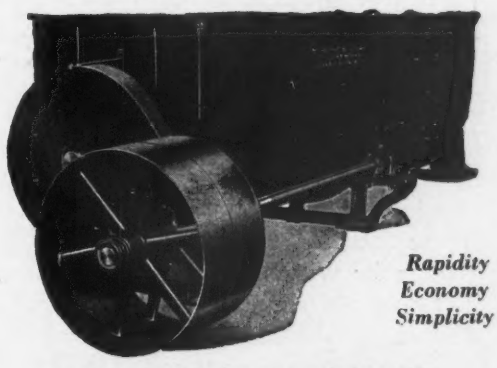

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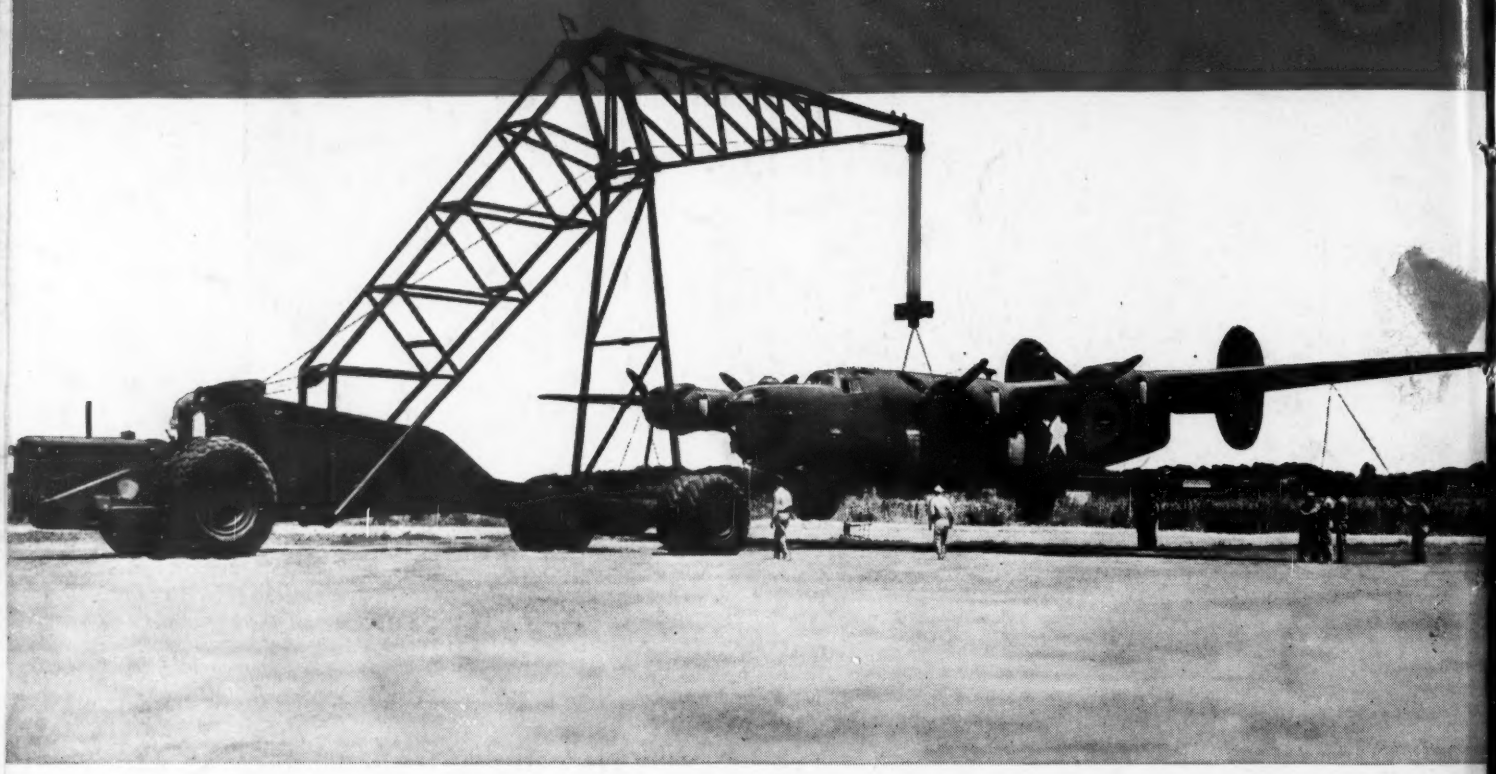

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